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The ELECTRICAL REVIEW

FOUNDED 1872

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FEBRUARY 17, 1933

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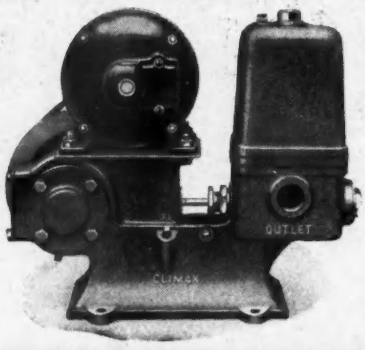

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The
Electrical Review

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Modern Generation

DURING the last discussion at the Institution of Electrical Engineers Lt.-Col. W. A. Vignoles attributed much of the increased output per unit capital cost of generating plant during recent years to the installation of larger sets for grid operation. Interconnected working has made their use practicable, but to our designers belongs the credit that full advantage could be taken of the opportunity offered.

It is due not only to the large individual capacity of modern generating units that the capital cost per kW has come down. Both material and space have been economised by hard thinking on the part of engineers, and this has influenced the situation very considerably. As examples, we may cite the overcoming of the problems incidental to the introduction of high steam pressures and temperatures, the building of large turbines to run at 3,000 r.p.m., the fabrication by electric welding of alternator stators, the construction of high-voltage generators, large three-phase transformers, and heavy-duty switchgear. Another factor is the erection of power stations on cheaper sites away from the centre of gravity of the load, which owes much to advance in cable technique; there are also those developments in telephony and protective gear, upon which interconnected working depends.

In the boiler house an enormous increase in the amount of water evaporated in a given space has reduced the capital outlay. This reduction could not have been gained merely by increasing the output of the steam generating units. The better use of radiant heating surface, with water-cooled walls, an improved rate of heat transfer, larger stoker grates, and the introduction of pulverised fuel—each has played a vital part.

On the other hand, the higher plant load factors made possible under the new conditions have encouraged the adoption of refinements that add to the cost per kW, but which are expected to result in better running economy. Among these may be included automatic operation, interstage reheating, three-point bleeding for feed-water heating, and air preheating.

A good idea of the technical improvements made within the working life of many engineers may be gained by comparing the most recent plant put into commission—the Dunston 50-cycle station, described in our last issue—with the near-by 40-cycle station, which was representative of advanced practice when it was built in 1910. Steam conditions at the boiler stop valve were 200 lb. per sq. in. and 570 deg. F., compared with 625 lb. and 840 deg., and there was then no thought of the reheat cycle or bled steam. The biggest turbo-alternator, 8,000 kW at that time, seems small by contrast with the modern 50,000-kW set, and the same applies to the boilers, 30,000 as against 156,000 lb. per hr. (the new Battersea station will have 330,000 lb. boilers). The old station required 2.35 lb. of coal per kW sent out; the new should require about half that amount.

Although the policy of generation has been standardised, its practice has not. There is still scope for the designer, and we believe that he will be right in making the utmost of what the inventor and the metallurgist can offer him in the future.

British Industries Fair

EXHIBITORS at Castle Bromwich and Olympia will be busily engaged from now until Monday next putting the finishing touches to their stands. From the particulars that are published in this issue of the ELECTRICAL REVIEW readers will be able to gather useful information regarding the products which British electrical and allied manufacturers are now offering to the home trader and the overseas buyer. We hope that the efforts of our producers will be rewarded by visits from all classes of purchasers. The event stands alone in importance as an electrical trade function; its success rests chiefly with electricity supply officials, consulting engineers, electrical contractors and dealers, export merchants, hardwaremen, architects and builders. All such we urge to visit Birmingham, in particular, the main section for electrical

exhibits; those who are specially interested in radio and several other more or less electrical lines are catered for as before at Olympia. May we look forward confidently to a lively market in electrical products from February 20th until March 3rd setting the pace in domestic and kindred sales for the rest of 1933?

A Notable Increase

THE official returns of kWh generated, issued by the Electricity Commissioners soon after the termination of each month to which they relate, are a valuable indication of progress, but the figures must be used with discretion. The number of public holidays and week-ends must be taken into account; also the weather, and influenza. Last month kWh generated amounted to 1,336 million, compared with 1,162 million in 1932, a jump of 174 million, or 15 per cent. January is notably erratic in this respect, as statistics for the past six years prove. Starting from 1928 the previous figures in million kWh have been 865, 1,033, 1,072 and 1,141. Looking round for reasons for the present increase we find that there was one Saturday less this year than last; adding a proportion of last year's rate of growth (7.4 per cent.) this should account for about 2¼ per cent. Then we had a brief cold snap, when electric fires worked overtime. Going back to the last really cold spell, in January, 1929 (when conditions were much more severe), we note that the increase over January, 1928, was 19.4 per cent. While this does show the importance of the heating load, we think that, generally, last month's returns are very encouraging.

Distribution Development

THOSE who took part in the discussions at the Institution of Electrical Engineers on "Distribution Development" were engineers whose records are excellent. They had no difficulty in showing that the criticisms of Mr. J. M. Kennedy and Miss D. M. Noakes did not apply to their own undertakings. It would have been more instructive if representatives of concerns that sell less than, say, 20 kWh per £ of capital expenditure had thought it worth while to justify their policy. Are they going to take it lying down? Are there insurmountable obstacles to development in such areas, or do those responsible deserve the hard things said of them? In either case they are a brake on electrical progress. They can have no future in an industry determined to carry all before it.

Rubber Research in Danger

WE regret to learn of a serious crisis in the affairs of the Research Association of British Rubber Manufacturers. Owing to the difficulties of organising research for such a varied industry on a voluntary basis, the Association, in combination with the appropriate trade organisations, introduced in 1927 a scheme for its maintenance by a small levy on raw rubber. Such a scheme requires Parliamentary sanction, and is therefore embodied in a Bill which has been before the House of Commons on every possible occasion, only to be lost, as most Private Members' Bills, except simple and practically non-contentious Bills, are lost, owing to the difficulties of legislation by this method. Our readers will be concerned with the affairs of this Association, since many of the principal cable firms are among its members, and it has also been very active in carrying out research on rubber-base insulating materials of the ebonite class, in co-operation with the British Electrical and Allied Industries Research Association. We anticipate being able to give further details shortly, but meanwhile we may express the hope that some way will be quickly found to give the necessary powers to the Association, which will otherwise be disbanded in a few weeks.

The Shannon Scheme

THE overdue accounts of the Electricity Supply Board of the Irish Free State have now made their appearance. *Prima facie* the progress so far made has been encouraging, as the deficiency of £200,000 for 1930-31 was reduced in 1931-32 to £24,600, but this does not make provision for the sinking fund, which comes into operation for 1933-34. In his article on a later page Mr. R. N. Tweedy draws attention to the dangers of political interference, and states that the effect of the recent increased charges has been to slow down development. We hope the Board will take whatever steps may be necessary to ensure that the rate of growth in the future shall not be checked. As almost all its working costs are standing charges, this is essential to ultimate success.

As We Expected!

THE Commission of Inquiry into the origin of the fire that destroyed *L'Atlantique* is quite satisfied that the cause was not electrical. The fire is now known to have broken out simultaneously at four separate points and to have spread with a rapidity that ruled out the possibility of its having been due to a short-circuit. In our issue of January 13th we strongly deprecated the irresponsible manner in which so many daily papers suggested an electrical cause without a tittle of evidence. It is not to the credit of these journals that they should have caused the safest of illuminants to come under suspicion. Will this case teach them a lesson? We should like to think so, but we are not hopeful.

Telephone Activity

WE have received reports of telephone activities in London, Manchester, Liverpool, and West Yorkshire. These all tell of considerable engineering improvements carried out during the past few months. Among these are the adoption of the "Telex" system, an increase in the number of automatic exchanges, and the extension of the "demand" system; and also subscribers in many centres can communicate directly with 95 per cent. of the world's exchanges. But the technical proficiency of our telephone engineers is unquestioned. What has been criticised in the past is the means taken for placing their skill at the disposal of the public. Throughout all these reports is a very welcome recognition of the telephone as a public service and a note of keenness for securing as many satisfied subscribers as possible. Thus, delays in connection, which used to be a common cause of complaint, no longer exist, except where wayleave difficulties arise; about 90 per cent. of the instruments are installed within a week of application, and most of them within a couple of days. Publicity, advertising, exhibitions, visits to exchanges, and other methods adopted by commercial organisations with something good to sell have all helped to increase the traffic in spite of trade depression.

Gas Consumption Falls

GAS, which has a most persistent habit of irritating the olfactory organ of the civilised, has during the past few weeks made its presence obvious to an even more sensitive part—the public eye. A number of gas companies have had to report a fall in gas sales in the year 1932, while electricity consumption has been advancing, but the gas apologists do not blame electrical progress for their setback; their disposition is to attribute it to the mild winter, economic depression, and the economies effected by the people.

Welding Apprentices

ELECTRIC welding is destined to play so large a part in shipyards that the recruiting of the men employed on the work has become a question of the first importance. Hitherto, the practice in repair yards has been to train workmen taken from other trades. While this has proved satisfactory, the numbers needed in the future will be greater than can be satisfactorily obtained in this way. Mr. James Patton, at the North-East Coast Institution of Engineers and Shipbuilders, has made the opportune suggestion that men should be definitely apprenticed as electric welders. This seems to us to be well worth consideration, as there is certainly a growing field for fine workmanship here.

THE principal electrical displays, together with most of the exhibits of an allied nature, at both the Castle Bromwich, Birmingham, and Olympia, London, sections of the British Industries Fair are described in the following pages. In most cases attention is directed particularly to the new apparatus, and appliances which have been improved and modified since last year without, of course, any implication that individual displays are limited in any way to novelties or the items enumerated. In this way it has been possible, with the co-operation of exhibitors, to bring together in a single issue of the ELECTRICAL REVIEW sufficient information to enable visitors to gain some idea of what will be on view, and more especially to judge beforehand what they ought to make a point of examining ; while those who are unable to go to the Fair will be able to form an impression of the variety of products exhibited.

The Birmingham Display

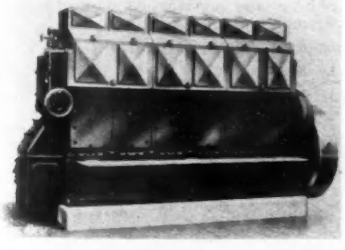
Acelite, Ltd.

"Acelite" fires are made in the form of a screen weighing about 11 lb., with loadings of 500-1,000 or 1,000-2,000 W, the size of the No. 4 model being 24 by 19.5 in. overall. In the fireplace it effectively screens the empty grate and brightens the hearth. Various finishes are available, the "Regal" being constructed of solid heavy-gauge copper or brass throughout,

The "combination" model combines in one unit a 1,000-2,000-W fire flush with a surround and hearth, the overall dimensions being 33 by 21 by 3 in. It is particularly suitable for bedrooms, bathrooms, and halls, and may be used with or without a flue. It is fitted with lugs for easy fixing to the wall, and is so designed that, when permanently attached, the fire unit is readily removable. The surround and hearth portions are made of heavy-gauge steel, vitreous enamelled in different colours to represent a tile pattern.

Alldays & Onions, Ltd.

A furnace and blowing equipment on the stand of Shell-Mex, Ltd., is of the standard oven semi-muffle type for heat treating high-speed steel and working at temperatures up to 1,400° C. The blast is



A Belliss & Morcom totally enclosed Diesel engine

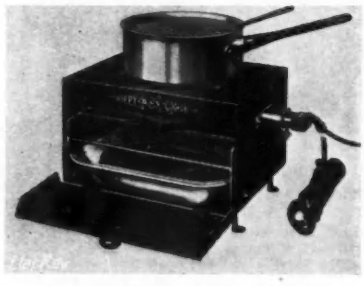
furnished by a 2½ L.S. steel-plate fan of the single-stage silent type, which is driven by a 1-h.p. squirrel-cage motor. Foster temperature control equipment is fitted.

Sir W. G. Armstrong Whitworth & Co. (Engineers), Ltd.

A semi-rotary non-crucible furnace is shown on the stand of Shell-Mex, Ltd., in a modified form, which allows the molten metal to be poured direct into ingots or moulds by means of a draw-off valve so positioned that the furnace can be emptied entirely without any variation in the position of the outlet nozzle. The possibility of oxidation of the metal is reduced, and the necessity of shanking the metal can be entirely eliminated with consequently reduced production costs.

H. E. Ashdown (B'ham), Ltd.

The range of mouldings to be shown consists of very small accessories of an ounce or two up to large mouldings weighing as much as 6½ lb. Prominent among the exhibits is a fine range of case mouldings, wireless and electrical acces-



The Berkeley & Young "Nippy" cooker

sories, and fittings for household use. The majority of mouldings manufactured are fitted (where necessary) with metal parts made throughout in the company's own works.

Ashmore, Benson, Pease & Co., Ltd.

An outside exhibit includes a short length of h.p. and l.p. overhead line employing "Fista" welded-steel poles, as described in our last issue. The company holds the sole rights for the manufacture and exploitation of these poles, which have been developed in conjunction with the J. L. Eve Construction Co., Ltd.

H-type welded poles incorporate outdoor pull-down switch-fuses and pole-operated fuse isolators manufactured by Switchgear & Equipment, Ltd.

W. & T. Avery, Ltd.

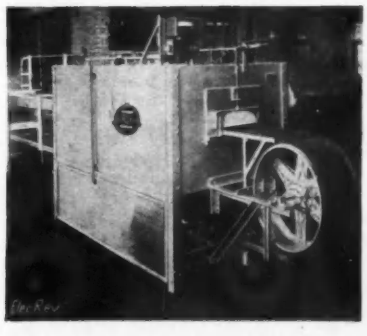
Machines shown for the first time will include a new visible indicating universal testing machine and a dual-ratio counting machine. A working exhibit, the automatic grain weigher, complete with elevator, will attract attention; similar types are made for handling coal, pulverised fuel, &c. No operator is required for these machines, which work continuously, being operated by the material flowing under gravity. The "Unit" count machine weighs, counts, and computes an unknown mass quantity of repetition articles mechanically.

Babcock & Wilcox, Ltd.

An outstanding item of this joint exhibit with subsidiary companies is a complete single-pass superheater with flash-welded tubes, designed for a final steam pressure of 385 lb. per sq. in. and to deliver 228,000 lb. of steam per hour at a final temperature of 710 deg. F. Another particularly interesting exhibit will be a working gravity bucket conveyor, which elevates as well as conveys the material horizontally.

A "Style 25" driving gear for chain-grate stokers, the heaviest which the company manufactures and approximately 7 ft. high from floor to top of casing, will be shown working, a similar model being stripped for inspection, while a full-sized No. 2 Fuller-Bennet mill will also be on view. The storage system of pulverised fuel firing will be represented by a Bailey feeder, which is almost proof against flooding and can feed pulverised coal in spite of a high moisture content. Recently introduced B. & W. technique of fusion welding will be illustrated by a fusion welded penstock pipe, 42 in. in diameter, 1¼ in. thick, and 19 ft. 9 in. long. Boiler models, valves and piping, calorised "Diamond" and Babcock-Clyde soot blowers are small exhibits of interest.

The Stirling Boiler Co., Ltd., will display motors of tri-drum boilers; Spencer-Bonecourt, Ltd., drawings and photographs of installations of their waste heat boilers; and the Erith Engineering Co., Ltd., photographs of the Erith Roe retort type stoker. Edwin Danks & Co. (Oldbury), Ltd., show a 14 ft. by 8 ft. economic boiler and smoke box, a half-Lancashire boiler, 9 ft. in diameter, and examples of press work, &c. The exhibit of the Calorizing Corporation of Great Britain, Ltd., will include pressed steel boxes and pots for case-hardening, annealing, cyanide, lead and salt hardening, also calorised solid drawn steel pyrometer sheaths, together with boiler furnace and superheater support castings in "Calmet" high-temperature alloy.



A belt conveyor bright annealing furnace (Birmingham Electric Furnaces, Ltd.)

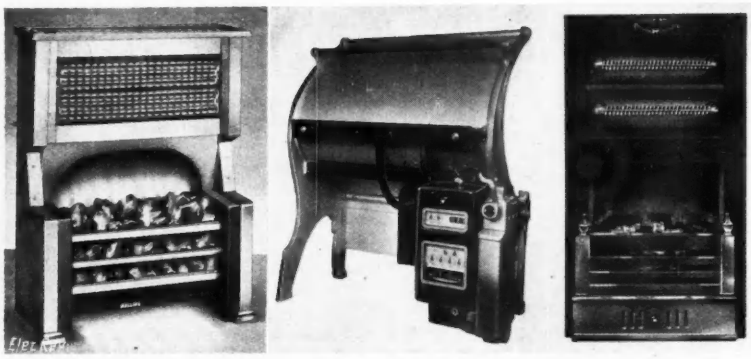
Bakelite, Ltd.

This company's displays at Birmingham and London will be similar, being intended to emphasise the increasing use of synthetic resin products and their diverse applications in many different industries. The comprehensive exhibit comprises mouldings produced from "Bakelite" moulding materials; laminated sheets, tubes, and rods; silent gear material; insulating varnish and lacquers; oil-soluble resins, and varnishes made therefrom. A feature is special new types of moulding materials produced to give specific properties, such as high impact strength, low dielectric loss, resistance to moisture, non-bleeding, non-blistering, &c.

Belling & Co.

A special feature will be made of a full range of all-enamel cookers, consisting of five standard types in vertical and horizontal models. In addition, the first of a new series will be on view for the first time. A "Tem-set" switch enables a constant oven temperature to be maintained, and the double-purpose boiler-griller plate is quick and economical. It is made of a nickel-chromium alloy and is 8 in. square, being controlled by a 3-heat switch. The oven is enamelled all over and the corners are rounded for easy cleaning. Plug-in elements at the top and bottom are completely enclosed. The little breakfast model is particularly attractive.

There will be immersion heaters for fixing into existing tanks or cylinders, and for use in conjunction with the ordinary domestic hot-water system.



The Belling "Cheery" coal fire, the Ferranti combined hotel fire and prepayment meter and the "Register" fire (British National Electrics, Ltd.)

Sundry small domestic appliances will include warming plates, and among many different types of fires there are some new models introduced this season. In the domestic range are several new finishes, as well as imitation coal and glowing-log patterns. There is a very handy little heater which is very suitable for small rooms, or in cupboards for airing purposes. Another is the bar fire, in which the radiant multi-parabola bar is visible through slots in the top and sides of the iron casing, which is made for screwing to the floor or walls. More of an industrial type are the totally enclosed and fireproof air-warmers and hot-water radiators for heating by convection at low temperatures. Immersion heaters are used, so that there are no circulating pipes for the water. The air-warmers have domestic as well as industrial applications. The "Convexo" fire has a flat back designed for screwing on to tiles, marble, or other fireplace surrounds; while screens and metal surrounds are made for the purpose of standing in front of existing fireplaces, or being fixed to the tiles or the back of an electric fire, and so hiding the grate.

Belliss & Morcom, Ltd.

The company's latest development is in Diesel engines (illus.) in sizes up to 180 kW with up to eight cylinders. They are designed to run at a speed of 600 r.p.m. and, although totally enclosed, are nevertheless readily accessible. There is a locking device between the air starting valves and the fuel valves, and by simply turning a wheel these valves are made to operate automatically in their correct sequence. All the engine controls are grouped at the governor end, where are also the tachometer and the oil-pressure gauge. This type of engine is suitable for both land and marine service.

Besides a small compound steam engine, a two-stage air compressor, a small turbine, and a gas compressor will be on view designed in connection with experiments on the possibility of using coal gas in place of petrol or fuel oil for internal combustion engines.

B.E.N. Patents, Ltd.

A new two-gun mobile "Pneu-Matic" paint-spray plant weighs 5½ cwt., but the load is so evenly distributed that the machine can be wheeled with very little effort. The carriage has pneumatic tyres, and the compressor delivers 10 cu. ft. of air p.m. The price of the motor-driven set (£82 net trade) is lower than that of the petrol-engined set. The "Handi-Spray" portable outfit, priced at £18 10s., was described in detail in our February 3rd issue, p. 161.

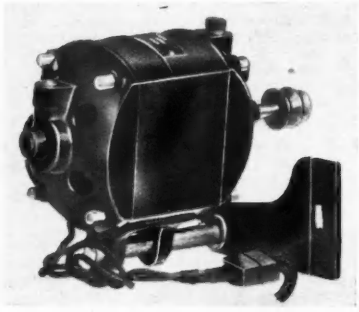
"Flex-shaft" machines for polishing, drilling, brushing, and similar operations, are made in pedestal and suspended models. The four-speed countershaft belt-driven type operated by a ½-h.p. motor, is popular because of its adaptability. Means are provided for earthing all machines.

Berkeley & Young, Ltd.

Two new bowl fires have solid copper parabolic reflectors with adaptable element guards which can be locked in any position; when upright dishes can be stood on them to keep warm. Type D110 has a carrying handle and retails at 10s. 6d., while D109 has a lighter base in which a slotted hole is provided for fixing the fire to a wall, the price being 9s. 6d. without a handle.

The "Nippy" combination griller, boiler, toaster, oven, and radiator (illus.) at 12s. 6d. is an attractive cooker, which can be used almost anywhere, as its dimensions are 14 by 7½ by 8½ in.; it has a loading of only 650 W. The company's flat irons are made with coloured enamel as well as nickel and chromium finishes, while a toaster shown has a flat top on which a plate can be kept warm. The "Utility" heater is compact and fireproof, and is thus very serviceable where local heat is required.

Among the large variety of fires and radiators are the "Panelle" designed for permanent fixture with a tiled surround,

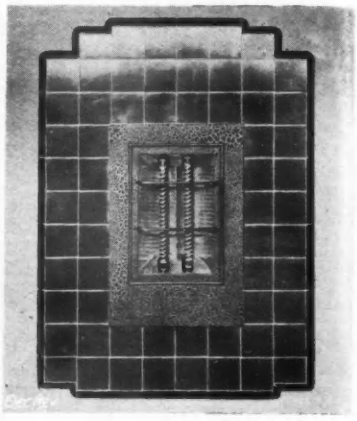


A B.K.B. sewing-machine motor

and the "Amazon," which is more pretentious and enamelled in art shades. The "Coronet" has a curved hammered copper reflector, while the "Mirraglo" is a portable "flaming" fire.

Berry's Electric, Ltd.

Representative models of the wide range of "Magicoal" fires include braziers, period fires, and portable models, as well as the new "Rayberry" and "Starberry" "Magicoal Plus"



Bratt Colbran fire with rustless tile surround

equipments. Most of the ordinary "Magicoal" fires can be supplied with "Magicoal Plus" fuel at 5 per cent. above list prices.

Among the water-heating apparatus there is a new "Under the Basin" heater shaped like a foot-stool, it being primarily intended for hairdressers. It is of the non-pressure type, and a mixing valve renders more than one tap unnecessary. In introducing a broken-feed equipment, the company has adopted a new principle with the broken-feed arrangement inside the tank, thus avoiding loss of heat by conduction. "Canvarys" are well to the fore, and a cistern-type heater may also be seen. The introduction of coloured-tank finishes should prove popular.

A. W. Bentteil, Ltd.

All standard products will be included, one of the most interesting being the "Linolite" facia lighting reflector. "K-Ray" display and picture lighting are included, as well as showcase, shop window, and cornice reflectors, shelf signs, fixing clips, porcelain lampholders, &c.

Birkby's, Ltd.

This company's exhibits at both London and Birmingham will comprise a large number of mouldings showing the manner in which "Elo" products have been utilised in fresh spheres. Among them are moulded wireless cabinets, electric clock cases, scale mouldings, telephone sets, vacuum cleaner fittings, fuse parts and water-heater fittings. Considerable development has also taken place recently in the manufacture of resins and varnishes used in the electrical and allied industries.

Birmingham Battery & Metal Co., Ltd.

This stand is constructed entirely from the company's own products. In front are examples of large seamless copper and brass tubes of 6 in., 12 in., and 18 in. inside diameter, such as are used for steam pipes and other engineering purposes. Six main pillars support the facia of the stand. Two of them consist of B.B. special finish copper housing pipes for water and heating purposes, while the other four are columns of cupro-nickel and aluminium-brass condenser tubes.

The office is walled and panelled in copper, brass, phosphor bronze, and gilding metal, and at the front of the stand is a revolving turntable which carries a piece of the largest diameter solid drawn tube made. The size of this is 24 ft. inside diameter, and 3 ft. long.

Birmingham Electric Furnaces, Ltd.

Four electric furnaces will be shown in operation, each complete with all necessary auxiliary equipment, so as to represent an industrial installation. The belt-conveyor bright annealing furnace (illus.) represents a type not previously available in this country which renders unnecessary the apparatus previously required for cleaning the oxide from annealed work. The principle of operation consists in maintaining the work in a neutral or

reducing atmosphere while it is given the required heat-treatment, and afterwards, while it is cooled to a temperature at which it may be exposed to air without the formation of oxide.

A new forced air circulation furnace for low-temperature heat-treatment will be shown for the first time. A charge progress recorder affords exact control of the treatment in respect of both temperature and time up to 700 deg. C.; the essential principle of the design is the heating of the charge by the forced circulation of heated air, direct radiation from the heating elements being prevented by a metal baffle. The combined automatic temperature controller and charge progress recorder operates from two thermocouples, one placed in the stream of hot air leaving the heating elements and the other in the path of the air which has passed through the work.

A number of different types of instruments for the automatic control of furnace temperature will be shown in operation.

B.K.B. Electric Motors, Ltd.

These small power specialists make a varied selection of d.c. and a.c. motors, among which is a number of new and revised models and units, especially for sewing machines (illus.), cinematography, recording instruments, with adaptations for many forms of speciality drives, including low-speed reduction gears.

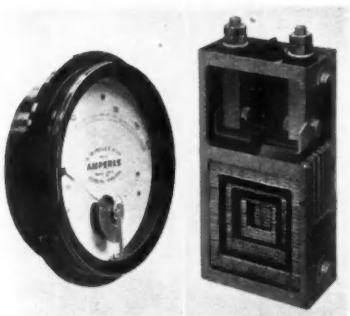
Amongst the larger sizes is a range designed especially for domestic and small commercial refrigeration and other compressor and pump units for d.c. and a.c. single-, two- and three-phase, and others for the dairy and agricultural industries. An alternative method of feet fixing can be supplied on request and without extra cost. An efficient range of polyphase models includes fractional h.p. slip-ring motors and rotary alternators for neon signs.

These machines are manufactured by Geo. Kent, Ltd., Bulpitt & Sons, Ltd., and Berkeley & Young, Ltd.

S. O. Bowker, Ltd.

The "Tenby" wiring system is well known throughout the trade, and the simplicity, safety, and the economies claimed to be effected by its use have a wide appeal. The metal universal junction box is of ample dimensions to take twelve cables, and the patent bonding device is simple to manipulate. The bonding is an integral part of the box, is rigid, and does not damage the cables. The neat electro-tinned brass cover is tightly secured, but so contrived that slight pressure on two corners will release it.

Switch plates, ceiling roses, and circular junction boxes made of "Bakelite" are particularly neat and clean mouldings. The special feature of the C.T.2 box is that it can also be employed as a ceiling rose, a "knock-out" in the centre of the lid being provided for this purpose with slots in the collar for flex entry.



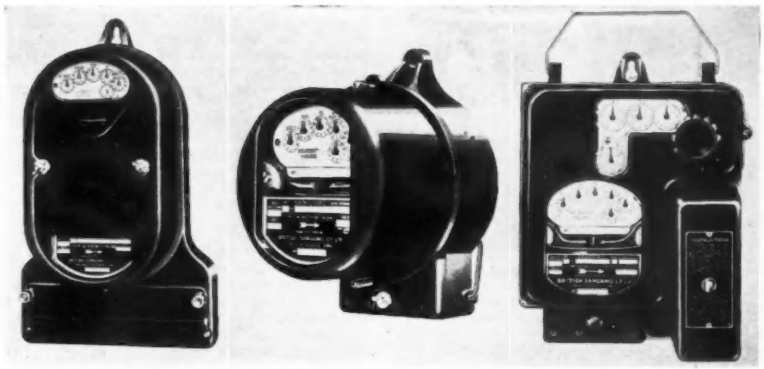
A Reyrolle "Forscale" flush-mounting ammeter and a "Britannia" flat-type alkaline battery cell

Thimble connectors, which were formerly made in Holland by the Ramie Union, are now being made in England. This labour-saving accessory has no loose grub screws; good connection is obtainable by a simple twist.

Bratt Colbran & Co.

As the creators of the "Heaped" fire, this old-established firm of fireplace designers has treated the electric heater as a development in the traditional manner of fireplaces rather than as an accessory. The centre suite of the exhibit features a plain and peach-tinted mirrored plate glass mantel, with rustless steel 5-kW electric radiator and polished black marble surround and raised hearth (illus.). Beige and orange "Veros" marbles form the keynote of another beautiful mantel, which is fitted with a rustless steel 3-kW radiator. A definitely modern note is struck by the rustless steel tile wall panel, with electric radiator in green enamel. Another attractive wall panel radiator is designed for use in a bathroom, for which purpose the fish-tile-slabbed surround is very effective.

An original form of portable radiator is the "Tu-Ways" heater, the heat being projected at the same time to both the front and the back from a single element. It is soundly constructed of polished rustless steel. Other models of particular interest include a convector radiator, and a radiator which is quickly interchangeable with a "Heaped" coal fire or similar grate without need of an electrician.



New Sangamo watt-hour meters: the latest type "H.E.," and the "H.M." polyphase and prepayment models

Geo. Bray & Co., Ltd.

On this company's stand will be an interesting display of "Chromalox" productions and also several appliances made by other manufacturers in which "Chromalox" elements are fitted as standard. A "Bakelite" moulding press, made by Messrs. John Shaw & Son (Salford), Ltd., will be in operation, and a series of boiling plates to which are attached thermometers giving the surface temperature of the plates under actual working conditions will be shown. A complete selection of standard heating elements, boiling plates, range units, immersion heaters, and radiators includes heaters for railway coaches, as supplied recently to the Danish State Railway.

Samples of a wide range of porcelain insulators and refractory supports for hot resistor wires, in the form of radiant fire elements, bowl fire refractories, tubes, connectors, washers, bushes, &c., may also be inspected.

Britannia Batteries, Ltd.

For the first time examples of the new flat-plate nickel-iron and nickel-cadmium batteries (ELEC. REV., December 9th, page 858) will be shown (illus.). These batteries range from 31 to 450 Ah (5-hour rate). Tubular alkaline batteries are available in capacities from 11 to 690 Ah (5-hour rate). Stationary batteries for house and cinema emergency lighting have heavy Planté positive plates and box-type negative plates.

Electric vehicle batteries ranging from 90 to 660 Ah (5-hour rate) are of the lead-acid type with tubular positive plates and grid negatives. There is a range of marine batteries similar internally to the vehicle equipments, but with specially designed containers with large clearance spaces above and below the plates.

Designed specially for the Western Electric Co.'s sound system are 6-V, 108-Ah and 6-V, 150-Ah batteries, while 6-V, 200-Ah batteries are used for other systems of sound reproduction. All these "talkie" batteries are of the lead-acid tubular type and are guaranteed for three years.

Britannia Electric Lamp Works, Ltd.

Incandescent lamps of the vacuum, gas-filled, traction, and candle types are made in sizes from 15 to 2,000 watts, and a double test is given to every lamp prior to leaving the works. The latest addition to the "Britram" range is a new series of motor car bulbs. All lamps are made to B.E.S.A. specification and guaranteed to be of 1,000 burning hours.

Britannia Tube Co., Ltd.

Here will be shown a display of tubes and sections of all sorts of shapes and sizes, made of copper, steel, stainless steel, "Cindal" non-corrosive aluminium alloy, &c. Welded, cold-drawn, closed and open-jointed, and cased tubes are made in great variety for most manufacturers' requirements.

British Electric Domestic Appliances, Ltd.

The "Bedal" domestic appliances include a hot and cold hair dryer, which is nickel plated and incorporates an earthing device; flat irons with a patent "either-way" connector; and an 850-W 2.5-pint aluminium kettle which stands on insulating feet and is fitted with a nickel-chrome circular element, wound on mica and so affixed as to avoid piercing holes in the base, thus reducing the risk of leakage.

The main exhibit is, however, the "Mary Ann" vacuum cleaner, of the cylindrical runner type with a universal ball-bearing motor encased in "Bakelite" for safety. The carbon brush gear is accessible and the loading is 220 W. The usual accessories are provided, and a carrying handle is attached to the leatherette covered body, inside which is the bag which collects the dust. The rubber-covered connecting cable terminates in a "Bakelite" plug in which is incorporated an on-and-off switch, the other end having a combined wall plug and lampholder adaptor.

The "Goblin Wizard" vacuum cleaner (British Vacuum Cleaner & Engineering Co.)

These machines are sold only through legitimate trade channels—through wholesalers and retailers.

British Hard Rubber Co., Ltd.

This company is the sole manufacturer of "Permcol" ebonite sheet, which has a mirror-like polish that will not discolour, it is claimed, even when exposed to strong sunlight. It is made in three finishes—black, mahogany, and walnut. Besides such general goods as accumulator lids, machined parts, &c., composite material is made up into sheet, rod, tube, and moulded shapes specially suit-

able for use in hot climates. Various grades of dust as utilised in the manufacture of ebonite and others for direct moulding purposes are supplied also.

British National Electrics, Ltd.

Besides the lighting exhibits at Olympia, there will be a display at Castle Bromwich of heating and cooking equipment for domestic use. Among

Canning rotary chrome-plating apparatus

fires there is the "Floodheat" type which has chromium-plated reflectors and plug-in elements, while some of the "Floodlight" models combine these features with imitation fuel, in a number of models flicker and smoke effects being incorporated. Replicas of dog grates have combined vertical pedestal radiators, and these fires are also supplied in some cases in conjunction with special synthetic stone or marble surrounds (illus.).

All this company's flat irons are fitted with a fixed cord-grip connector which prevents all tugs and strain being transmitted to the terminals.

The breakfast cooker (and slightly larger table model) is vitreous enamelled throughout, and has a 9 by 7-in. combined grill and boiling plate loaded at 1,800 W; it is controlled by a three-heat chromium-plated switch. The larger cookers incorporate a special system of oven construction, providing protection against the effects of moisture, creepage of fat, &c.

On the same stand there will also be a display of the products of the J. P. Tubular Heater Co., Ltd. (an associated company), including rigid, flexible, and protected low-temperature tubular heaters, electrically heated towel rails, motor car bonnet heaters, &c. A feature will be an example of l.t. heating with a concealed heater recessed into the wainscoting and mounted on an ornamental grille, the latter being hinged so that the entire heater may be swung out in an upward direction for cleaning out the recess in which it fits.

British Oxygen Co., Ltd.

The fabrication of engineering parts from steel plate and standard sections is becoming an established practice in many industries, and the oxy-acetylene cutting equipment and electric welding plant utilised for this process is being demonstrated on two stands. Practical examples of work executed by these two methods as well as specimens of tests carried out by the company and independent authorities are available for examination.

The "Metallisation" process of spraying metals to form protective coatings, which the company has recently taken over, forms a special exhibit.

British Sangamo Co., Ltd.

A new single-phase meter, type "H.M.," is an improvement on the existing type "H.E." in that it has a higher torque and a lower watt loss and is less affected by stray fields. An outstanding feature is that both the base and the cover will be of moulded "Bakelite."

A new prepayment meter, type "H.M.P.P." (illus.), instead of being arranged for one coin only, has been arranged to take either a shilling, sixpence, or penny in the same coin slot. The base and case are made of "Bakelite" and the meter portion itself embodies the type "H.M." interior.

A polyphase meter (illus.) with bottom connections will embody the new type "H.M." construction, although the base and cover are of metal; the terminals, however, instead of being situated at each side as has hitherto been the case in Sangamo meters, are now located at the bottom. They are to be "Bakelite" insulated and will be easily individually replaceable. The meter can be supplied in either 3-phase 3-wire, or 3-phase 4-wire type, with two elements.

British Thomson-Houston Co., Ltd.

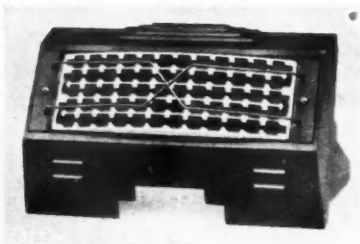
This stand is in the same position as in previous years but considerably larger, and for the lighting effects over 600 standard "Mazda" lamps are used. The structure consists of eight pillars, made of a new diffusing material (a glass-impregnated fabric) stretched on a wooden framework, each pillar being internally lighted.

Half of the interior space is devoted to lamps, the main exhibit being a model railway station and village, with pylons and overhead cables running back to a typical modern power station in the distance.

A variable-speed a.c. (shunt characteristic) commutator motor, with push-button control and speed indicator on pedestal, is in operation under the control of visitors. At the present time similar motors in operation for such applications as driving paper-making machines, printing presses, lifts, etc., total over 50,000 h.p. "No-lag" power factor correcting motors and fractional h.p. motors are also represented, apart from four types of electric gramophone motors.

Publicly shown and demonstrated for the first time is one of the range of electro-hydraulic thrustors, a self-contained unit giving a smooth straight-line thrust through a given stroke. Among its functions are the application of pressure, actuation of lever mechanism, or replacement of muscular effort on foot- or hand-operated machines, and for gear changing on heavy machine tools.

One of the latest sound-amplifying equipments for gramophone records is remarkably light and compact, weighing only 38 lb. and measuring only 13 by 14 by 8 in. high, yet giving an undistorted



The new Carron "Saturn" fire

output of 10 W. Another new development is the 5-W gramophone amplifier which has been designed particularly for reproducing gramophone records in cafés, lounges, hotels, etc.

Over 700 B.T.-H. talking-film equipments are now installed in theatres in this country and overseas. The 16 mm. portable sound-on-film reproducer can be operated in perfect safety by the uninitiated, while the use of non-flam film, which entirely obviates the risk of fire, and the very low transportation charges involved, make possible the introduction of "talkies" to the smallest and most isolated villages and rural areas where electricity is available.

British Vacuum Cleaner and Engineering Co., Ltd.

The "Goblin Wizard" domestic cleaner (illus.) at £5 19s. 6d. and the "Clean Sweep" (internal bag type) are moderate price machines having much to recommend them. The "Triumph" is a high-grade eleven guinea cylindrical model, while the "Magic Wand" is a special design of the enclosed dust bag type; the latter, selling at £7 17s. 6d., is light enough to be held in one hand and is very adaptable. The company also makes both fixed and portable industrial vacuum plant.

Broom & Wade, Ltd.

There will be exhibits in the "Quarry and Road" Section, consisting of air compressors and vacuum pumps, with accessories, of both the rotary and reciprocating types. The compressors are arranged for engine or belt drives, and are of various capacities for a pressure of 100 lb. per sq. in.

Bulpitt & Sons, Ltd.

To the "Swan" brand of electrical apparatus a number of additions have been made, particularly in the case of fires. A special feature is being made of various types of radiators built into attractive art metal screens. They range from a simple screen fitted with a 650-W bowl fire for occasional heating purposes, selling at £1, to a large 3-kW model (£3), which is designed to retain the maximum amount of convected heat in the room and is made to fit flush against the grate opening. Also shown for the first time is a 2-kW screen fire, arranged with a hinged panel attached to a pair of heavy "dog legs."

A ¾-pt. table kettle constructed of copper and highly finished in chromium plate is a new production that embodies the standard 1,000-W automatic safety element. A plate warmer, measuring 20 by 10 in. and loaded to 150 W, is also offered. It has a solid figured aluminium top, insulated handles and feet, and sells at 30s. In addition, a full range of "Swan" brand ¼-in. thick ground base utensils for use on electric hot plates and cookers is being displayed.

Burnley Components, Ltd.

A new item is a dual-purpose boiler which has recently been added to the large range of "Burco" domestic laundry appliances. The heating element is machine wound, metal sheathed, and fixed to the bottom of the clothes boiler. Two types of safety cut-out are available. These wash-boilers are obtainable in polished copper, aluminium, porcelain enamel, and bright colours in cellulose.

Cambridge Instrument Co., Ltd.

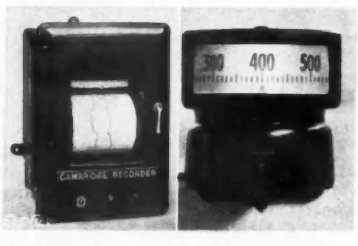
Typical groups of newly designed flush mounted instruments will be arranged on panels as they would be actually installed in a power plant or works.

"Easy-to-Read" dial thermometers may be adapted for the automatic control of temperatures, and in this connection there is a simple and effective gas regulator, as well as a dial thermometer fitted with special contacts for use in conjunction with a Bray contactor.

A recent modification of mercury-in-steel thermometers is the fitting of bulbs made of a special steel alloy, which can be safely exposed to higher temperatures than was previously desirable in this type of instrument. They can, therefore, now be supplied for measuring temperatures up to 800 deg. C or 1,470 deg. F. A quick acting electrical thermometer possesses unique rapid response to temperature changes, steady readings being obtained in about four seconds, while small changes are instantly registered. The new form of indicator in which the illuminated scale moves past a fixed pointer is particularly adaptable for flush mounting on panels. The magnification of the scale is such as to give, in the instruments exhibited, a virtual length of scale exceeding 20 in. An inexpensive form of thread recorder, "Model B" (illus.), which was originally designed for single point recording only, has recently been modified so as to provide simultaneous records from two points.

Automatic temperature regulators of the potentiometric type are capable of making or breaking electric currents up to 10 A at 250 V, *i.e.*, sufficient to operate switches or motor-driven valves without the use of an intermediate relay.

A new form of sensitive precision gauge for indicating draught or pressure up to 5 lb. per sq. in. is a wall type of similar form to the company's thermo-electric indicators, having a scale approximately 7 in. long, which may be arranged to cover a minimum range of



The Cambridge model "B" recorder and illuminated moving scale indicator

only 1 in. of water, so that extremely accurate readings can easily be obtained.

A smoke density recorder works upon a different method from other forms, and has the distinct advantage that the high percentage error usually experienced when smoke is deposited upon the optical surfaces is in this new design reduced to a very small percentage. A dew point

recorder records the actual temperature at which moisture will be deposited from flue gas, whatever its chemical composition may be, while a robust boiler house instrument which records the percentage of oxygen in the boiler feed water on a chart calibrated in cu. cm. per litre of water enables defects in the feed water system to be instantly detected.

Candy & Co., Ltd.

This display will consist of some twenty-four complete "Devon" fireplaces, among which are included the company's latest modern faience designs, together with a 2-kW radiator made of stainless steel, slabbed-up with tiles so as to form an artistic wall panel.

W. Canning & Co., Ltd.

A recent development in chrome plating equipment is rotary apparatus (illus.). The operating principle is automatic, the articles to be plated being hung on the cathode ring by suspenders or wires, and carried once round in the plating vat at a speed which coincides with the required period of deposition. Another new feature is a very small plating barrel termed the "Minor," for articles of a size commensurate with its capacity, being fitted with a container suitable for working in nickel, copper, cadmium, zinc, silver, brass, etc.

There will be a working model of an automatic nickel plating plant. Salt spray test apparatus enables rapid and accurate tests of resistance to corrosion to be made on plated iron and steel articles.

Among the examples of metal polishing and finishing equipment is the latest design electric polishing motor with a.c. motor of squirrel-cage type, totally enclosed in snout type bearings. A novel feature is the self-contained dust exhaust unit, with independent fan to each hood. The hoods are connected through trunking with a cyclone collecting chamber placed at the back of the machine. Another electric polishing lathe has its motor and drive contained in the machine casing. The machine is designed for either a.c. or d.c.

Two examples of rod and tube polishing machines are to be shown, one is of the vertical type and the other horizontal; also a 24-in. double-ended disc grinder, 30-in horizontal disc grinder, self-oiling ring bearing, and adjustable roller bearing polishing lathes. Examples of Canning low-voltage dynamos and motor generators include dynamos of 15 and 5,000 A, and a motor generator of 500 A output. A lacquer spraying outfit with two compartments will also be on view.

Carron Company

There will be a wide variety of fires and some of the more popular models, such as "Canterbury" and "Argus," will be displayed in a variety of sizes and

The "Cyclonette" electric horn (Cyclone Hooters)

finishes. Two period models, "Drake" and "Nelson," of the imitation coal fire class, are being displayed in a mantel with surround.

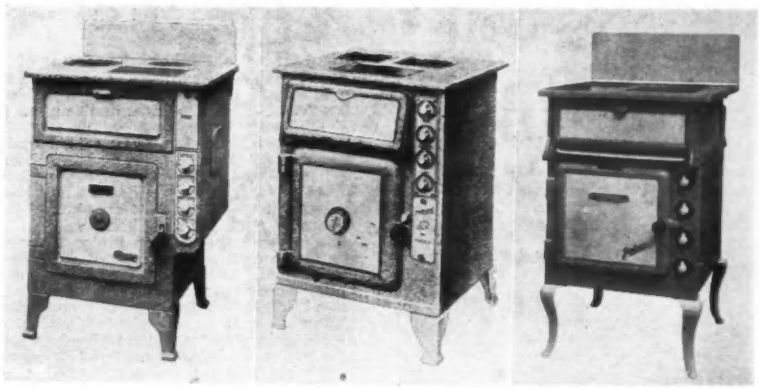
A small fire, the "Saturn" (illus.), is shown for the first time. It is of cast-iron of novel design and has a high heating efficiency. The measurements are 12¼in. wide by 4½in. deep by 6¼in. high. It weighs 10lb. and has a loading of 1 kW. The company is also showing for the first time three sizes of an inset fire. Simple and attractive in design, this fire, while fitted with the company's "Stella" fire bar, can also be heated by convection. The inset fires, which can be easily fixed, are made in 1, 2 and 3-kW sizes and supplied in a variety of finishes, including enamelled and chromium plated.

Another new development is a tubular heater for public and private buildings. This heater, which has a particularly strong heating unit, consists of a 2in. dia. steel casing covering the heating unit and terminals. The heating unit is made of a sheet-steel channel supporting porcelain chairs which, in turn, support porcelain tubes forming a continuous tunnel through which the nickel chromium is drawn. It is made in 2 to 16-ft. lengths with a loading of 60 W per foot.

The "A1" (illus.) and "A2" cookers just introduced have doors fitted flush with the front so that, beyond the oven door handle, there are no projections. An improved appearance is thus given, while cleaning is easily and efficiently carried out. The oven interior can also be removed for cleaning. The "A1" cooker will cook for 4 to 6 persons, and the "A2" for 6 to 8. There is also the "Carronette" cooker, which is now fitted with a door to the hot cupboard. This efficient little cooker will do all the cooking for a family of 2 to 4 persons. Two sizes of the breakfast cooker are now made, together with irons and kettles.

H. W. Carter & James, Ltd.

These specialists in electrically welded wirework make strong and effective accessories for all sorts of electrical appliances, *e.g.*, oven, grill, and toast racks, guards for fans and bowl fires, flat wire guards for trivet reflector fires, and bar guards for upright radiators. Galvanised well-glass and hand-lamp guards, wire frames and shapes for lamp shades are also produced, as well as handles, hooks, rings, clips, and brackets for every purpose, which are made of steel, brass, copper, aluminium, phosphor-bronze, etc., and constructed to blend with the appearance, and add to the safety, of any piece of electrical apparatus.



Three new cookers: The Carron "A.1," Hotpoint-B.T.H., and Jackson "94/5J"

Chloride Electrical Storage Co., Ltd.

A representative selection of storage batteries is in three main categories: (1) Chloride batteries for stationary installations, such as country house lighting plant, central power stations, marine work, and also for emergency lighting in theatres, cinemas, etc.; (2) "Exide Ironclad" batteries for marine work; and (3) "Lux" batteries for lighting railway trains.

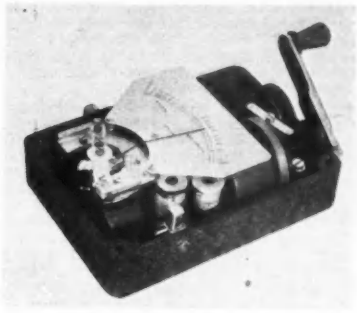
The "Keepalite" system of automatic emergency lighting for hospitals and other public and private buildings is shown in operation, and there are also exhibited complete ranges of "Exide" and "Drydex" batteries for radio purposes. These specialised productions are displayed in more detail in the Wireless Section at Olympia.

Clang, Ltd.

On this stand there are exhibited two- and three-way bayonet lampholders; three-way plug sockets, one with three 5-A, and one with two 5-A and one 15-A outlets; iron connectors with and without switches; and a single-way plug bayonet lampholder. All these accessories are constructed in "Bakelite," and were described in our last issue. There is also a mortise-type metal switch for incorporating in vacuum cleaners, etc.

Clear Hooters, Ltd.

This company's electric horns are supplied complete with cable, push-button bracket, and clip fitting. They weigh from 1.5 to 2 lb. each, and most of them are suitable for 4, 6, and 12-V operation. The "Clarion" is a high-frequency type, producing a high-pitched whistle-like note; both medallion and trumpet



The "Wee-Megger-tester" with cover removed (Evershed & Vignoles)

models are available. The "Q" medallion model functions on the resonant disc principle, and has an improved diaphragm. The "Clear Hoota" horn emits a powerful musical note.

The "Owl" push button is well made, designed not to rattle, and will respond to the merest touch. Different models are made for cars, and for the handlebars of cycles, in black ebony or chromium plated.

Commutator Grinding Block Co.

There has been a substantial reduction in the prices of the company's blocks, which are made for grinding the commutators and slip-rings of all electrical machinery, even those of small fan motors. The blocks remove the minimum amount of material and leave a smooth finish. Various shapes and sizes are available, of different coarseness, all with correctly curved surfaces. The grinding is done under running conditions, without dragging the bars, and the blocks may be used on either flush or undercut commutators.

Cooke, Troughton & Simms, Ltd.

The Vickers projection microscope made by this company is remarkably unconventional. It is designed for the metallurgical requirements of a modern factory, is exceptionally robust, will carry specimens up to 50 lb. in weight without fear of damage, and is so rigid as to be immune from outside vibration. The comparison screen enables the user to judge by direct comparison the effect of various heat treatments, fatigue, strain, and the equality or inequality of metals against an approved standard. A dark slide is also provided to enable photographs to be taken of the specimen for record purposes. The instrument is supplied with two sources of illumination, a clockwork-driven arc and a "Pointolite" lamp.

An instrument for the quick comparison of parts produced in quantities supersedes the use of high and low limit gauges. Accuracy is achieved independently of the touch of the inspector, who, after inserting the parts to be compared under a plunger, has only to observe the position of a bright line between adjustable indicators.

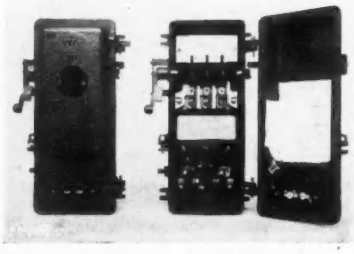
Crompton Parkinson, Ltd.

A range of a.c. motors will be represented from 1/20 h.p. up to the large auto-synchronous type, and d.c. motors and generators from 1/20 h.p. upwards. There will also be shown lamps, portable and switchboard instruments; sheet-steel cubicle switchgear, complete with current transformers and isolating switches; a "T.A.P." circuit breaker; new ring-main equipment of the oil-immersed pattern; "Klad" switchgear; and a pole-mounting circuit breaker.

Of special interest is the new Crompton-Weaving on-load tap-changing gear (illustrated), employing a patented system of compensating transformers, which take the place of the ordinary mid-point balancers. The method reduces the arcing tendency by reducing the break voltage, and thus the severity of the duty to within the capacity of ordinary selector switches without any mechanical complications. The voltage across the break is very little higher than the tap voltage, and is actually so low that after a test run of 50,000 complete breaks on a 500-kVA 11,000-400-V delta-star transformer no marks or burning of any kind were visible on the contacts of the switchgear used, while the oil in the switch tank remained in its original state and still withstood the B.S.S. 148 test. All the gear can be accommodated partly in the transformer tank and partly in an oil-filled box, and is operated by a handle. An ordinary drum controller can be used, free from such complications as quick-acting divertors and their auxiliary timing devices. Reduction gearing makes one revolution of the handle give one voltage step.

Cyclone Hooters.

The high-frequency "Cyclonette" horn exhibited (illus.) is intended to supersede the mechanical bells used on push cycles. This horn is supplied complete with cable, push-button, fixing bracket, and a robust container for an ordinary three-cell dry battery, the minimum voltage required being 4.5V. The weight of the horn is 12.5 oz., and the diameter 3.25 in.; its retail price is 6s. 11d. without battery, which costs 10½d. extra.



Donovan type "711" automatic push-button starter

T. H. & J. Daniels, Ltd.

Besides a 120-ton double acting press, hydraulic moulding plant for the "Bakelite" and synthetic resin trades includes a 75-ton plan upright press, having an 8-in. diameter ram and a cast steel cylinder for a pressure of 30 cwts. per sq. in. It is fitted with electrically heated platens, thermostatic control keeping the temperature uniform.

In addition to hydraulic moulding plant, the company has recently turned its attention to injection moulding of cellulose acetate and is exhibiting for the first time a power operated machine.

Since the tableting machine for preforming synthetic resin powder tablets up to 1½ in. diameter by ¾ in. thick was exhibited last year the company has developed a small machine for pre-forming tablets up to ¾ in. diameter, and a very much more massive machine for tablets up to 2½ in. diameter.

The company has made for Jacksons Millboard Co., Ltd., a cylinder mould for paper and board making claimed to be the largest made in this country. Various sizes of "Rotoplunge" pumps made for an associated company, the Rotoplunge Pump Co., Ltd., include one of the "Villiers" petrol driven sets mounted on a trolley, and also one motor driven "S" type pump suitable for water supply to a bungalow or small villa.

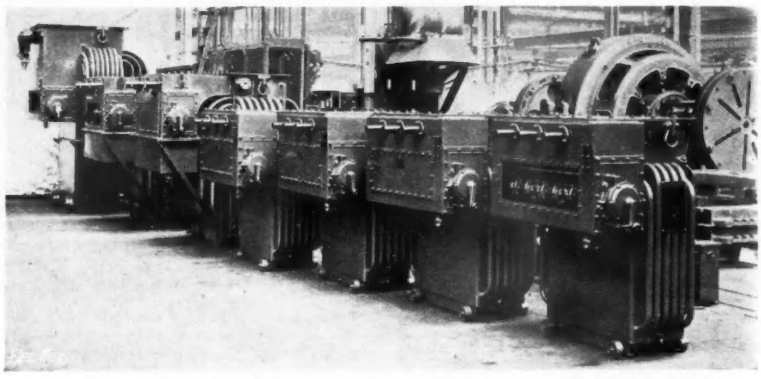
British Electrical Development Association.

E.D.A. will again occupy an octagonal kiosk in the centre of the Electrical Section, where full information will be obtainable concerning the electrical facilities available in any part of the kingdom. A "Guide to the Electrical Section" is also being circulated.

Dominion Machinery Co., Ltd.

The woodworking machines shown here will attract attention, particularly the electrically driven models. The Super Elliot combination, in its improved form, is capable of a wide variety of operations, and practical demonstrations will be given. A new attachment is available this year which takes the form of a square chisel attachment and operates in the same way as a mortising machine. A new model is similar, but designed to take in smaller work.

The new electrical vertical spindle moulder fitted with a two-speed motor and push-button stop and starter will be on view for the first time. It has been designed to take up little space, and the design is such that no belts have to be changed and there is no motor to raise, the touch of a lever gives either 3,000 or 6,000 r.p.m. instantly. A new tenoning and scribing apparatus has just been perfected for this machine. The combined hollow chisel and chain mortising machine is also "motorised," while saw benches with totally enclosed "motorised" chain drives running in oil have recently been placed upon the market.



Transformers fitted with new Crompton-Weaving hand-operated on-load tap-changing gear

Donovan & Co.

A comprehensive display of ironclad switch and fuse gear of the "Safuse" and "Donlok" types, together with control and starting gear of the manual and automatic types for a.c. and d.c., is shown, as well as ironclad plugs and interlocked switch sockets in sizes up to 100 A; the larger sizes of these are fitted with fuses as well as switches. A large cinema dimmer with individual and master control is prominent, while there is a comprehensive display of "Solink" isolating links for currents up to 2,000 A.

Exhibits not previously shown include an ironclad dust-tight switchboard, comprising an improved type of welded busbar chamber connected to a number of "Safuse" switches, this being the latest form of the well-known "Safuse" industrial panel for centralised distribution in factories, etc., at voltages up to 600 V; also small single-pole and double-pole normally open and normally closed magnetic relays for use with automatic control; "Donlok" plugs arranged with flexible conduit connection to the starter of a machine tool; the watertight form of the type "709" automatic push-button starter for a.c. motors up to 7½ h.p. at 440 V; and type "711" starter (illustrated) which combines the type "709" starter with an interlocked triple-pole isolating switch in the one case.

In the improved 15-A "Safuse" fuse the floating contacts are spring reinforced and have nearly 1 sq. in. of area per contact, *i.e.*, with the low current density at the contact of about 20 A per sq. in. only. Large and small a.c. and d.c. contactors, push-buttons, and other accessories for automatic control are also to be seen.

Dussek Bitumen & Taroleum, Ltd.

Some of the electrical insulating applications of "Trinidite" sealing compounds are illustrated by a Ferguson Pailin type "VSB-5" metal-clad switch unit filled with this material, and also various patterns of Johnson & Phillips joint boxes similarly filled. There is a semi-fluid grade for sleeve joints and hermetically sealed boxes. A panel demonstrates the various stages of making a joint with the aid of a "Dussek" spreader, which obviates the use of tapes and speeds up the operation of jointing 3-core and other cables.

"Nozzet" non-setting plastic cement is used for manhole covers, etc., and "Bitite" is a wood preservative solution which is also used for protecting iron and steel cable boxes and conduit, besides grouting in tramroad construction. Insulating varnish for overhead-line parts and cable and insulator oils are also made by this company, and representative samples of them are on view.

Earle, Bourne & Co., Ltd.

These makers of rolled metals and tubes in brass, copper, aluminium, and numerous alloys produce them plain for such engineering purposes as condenser tubes as well as ornamental, round, square, oval, flat, twisted and reeded, etc. Chromium-plated, nickel-silvered, and lacquer-cased tubing, mouldings, and light-gauge copper tubes for domestic services are also available.

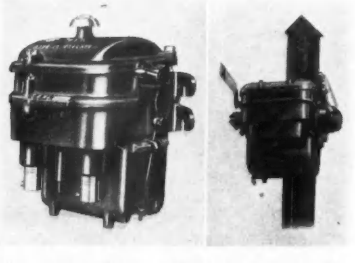
E. Elliott.

Accurate "Bakelite" and "Birmite" mouldings include a few moderate priced lines of switches, both wall and push-bar types, together with some table flash lamps. Well finished "Erinoid" turnings, such as wall-plug sleeves, bell pushes, knobs of various kinds, etc., are manufactured in large quantities for the electrical trade.

George Ellison, Ltd.

An extensive range of high- and low-voltage switchgear, oil and air break circuit breakers, motor control gear and accessories for sub-stations, overhead lines, industrial works and mines, will include truck and cubicle type sub-station switchgear units for 11,000-V 3-phase, of welded construction with oil circuit breakers and the usual instruments.

A "pull-down" high-voltage switch-fuse for overhead lines has operating gear arranged to bring the set of three fuses together down within reach of a linesman standing on the ground. Draw-out unit type switchgear of the metal-clad unit type is made for the low-voltage side of transformer sub-stations and industrial installations, while distribution switchboards comprise oil circuit breakers arranged in convenient groups for installations where a number of power circuits are connected to one or two main feeder cables.



The new Ellison "Bantam" and 660-V pole-mounting oil circuit breakers

A new overhead-line circuit breaker

(illus.) is arranged for fixing direct to a pole by a clamped bracket. A length of gas pipe serves as a shaft to couple the breaker to a handle enclosed in a box screwed to the pole at a convenient height for operation from the ground. The design is similar to that of other breakers of the Ellison range, and is thoroughly dust-tight and weatherproof. It is rated at 100 A 660 V, 3-phase, and designed to interrupt 15,000 kVA.

For such purposes as the control of motors on branch circuits which are fully protected from faults to earth by circuit breakers on the main distribution switchboards the company has introduced a smaller addition to its range of "Bantam" circuit breakers (illus.). It has a no-volt and one or two overload releases, as compared with the four releases on the previous models, and it is as small as possible consistent with mechanical strength. The new model is designed to carry 15 A at 660 V 3 phase, and it incorporates many details of its larger prototypes.

Ellison Insulators, Ltd.

This company is exhibiting, conjointly with George Ellison, Ltd., a selection of "Tufnol" tubes, rods, and sheets for electrical insulation, and a variety of machined component parts and gear pinions made from the same material, which consists of paper or fabric laminations, thoroughly impregnated with synthetic resin and baked under great pressure. The manufacturing process results in an exceedingly strong homogeneous material which can be worked with ordinary tools.

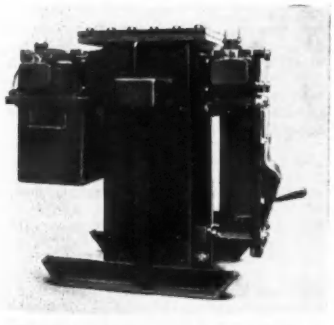
English Electric Co., Ltd.

This company is exhibiting for the first time. On one of its two stands electric cooking demonstrations will be given throughout the day at intervals. Of the six cookers on view, No. 201 is obtainable in vitreous enamel or semi-black finishes. The range of 1- and 2-kW fires enables selection to be made from eleven standard colours.

The other stand is devoted to industrial plant, such as a d.c. 200-A arc-welder; a model of dust-precipitation equipment by the Whesoe Foundry & Engineering Co., Ltd., operated by a 15,000-V d.c. generator; a 1,000-A 500/1,000-V mercury-arc rectifier; and a 300-b.h.p. airless-injection Diesel engine. Newer electrical items are a single-phase 1,500,000-kVA circuit breaker and a 150,000-kVA 11-kV metal-clad switch fitted with "De-ion" contacts; also a 100-A 12-kV thermal-trip oil breaker and drop-down metal-clad switchgear.

Induction regulators and sub-station fuse gear and distribution boards are also represented, while motor controllers include one of the flame-proof air-break drum type for a 60-h.p. machine and an air-break star-delta starter of 10 h.p. The newest of the motors on view are a 10-h.p. 970-r.p.m. induction machine of small diameter; a polishing motor of 0.5 h.p., 2,900 r.p.m., on a pedestal in which the starter is incorporated; and a 1-h.p. 930-r.p.m. single-phase capacitor with starting equipment, all of the squirrel-cage design.

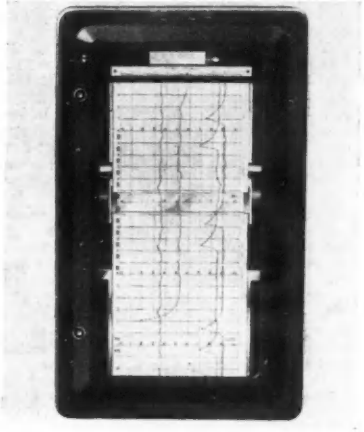
A new 5-kVA combined flame-proof transformer and switch (illus.) is suitable for coal-face and haulage-room lighting systems, or small power drills. The high-voltage switch is of the oil-immersed flame-proof type, fitted with overload coils. The transformer is of the double-wound semi-core variety, and the mid point of its secondary winding is brought out to a separate linked terminal for earthing purposes, the link being provided to facilitate testing. The low-voltage switch is of the air-break type, fitted with fuses and enclosed in a flame-proof case. The whole unit is mounted on skids for mobility.



An English Electric 5-kVA combined flame-proof switch and transformer

Eureka Vacuum Cleaner Co., Ltd.

This stand is being used for demonstrating the "Eureka" suction cleaners. This type of machine was originally made at Detroit, U.S.A., but Messrs. A. Reyrolle & Co., Ltd., purchased all the rights for the British Empire, and the machines are now being manufactured at Hebburn-on-Tyne. The British-made cleaners embody several improvements, among which is an attachment for moth-proofing, disinfecting, and deodorising; also a floor polisher and a detachable handle, so that the cleaner can be used inside motor cars, in cupboards, and on stairs, &c.



A Foster 7-in. chart recorder

Evershed & Vignoles, Ltd.

A comprehensive range of "Megger" insulation testing sets includes the "Meg" combined insulation and continuity tester, and the "Wee-Megger-tester" (illus.), which is of pocket dimensions (5¾ by 4 by 2¾ in.).

The standard equipment is wound for 500 V, the range being from 10,000 ohms to 20 megohms and infinity, with one megohm in the centre of the scale, each scale being separately calibrated. Voltages of 250 and 100 are also obtainable. The weight has been reduced to 3 lb. and the price is £8 5s.

The C. & S. system of distant indication utilises an instrument of any standard size, or a series of coloured lights, as an indicator, and the transmitter is unique inasmuch as it has no electrical contacts whatsoever. The only moving part is a copper sleeve which slides freely over a coil so that the float, or other device originating the movement, is subjected to the minimum of force. It is energised by a.c. or from direct-current mains through a small converter.

The Evershed-Midworth distant repeater demonstrates the principles of remote indication, summation, and control. It is flexible, any number of receivers, both indicating and recording, can be used from one transmitter and the number varied as desired without affecting the indications. No special apparatus, apart from the transmitter, is required, the receivers being ordinary moving-coil indicators and recorders.

Faire Bros. & Co., Ltd.

These manufacturers of insulating materials are featuring "Volprufe" insulating sleeving, which is a high-grade product manufactured from raw cotton; it undergoes a process of impregnation with oil varnish. It is capable of withstanding tests at pressures as high as 5,000 V and is used as an insulating covering for wires employed in the electrical, radio, and automobile industries.

Ferranti, Ltd.

The well-known features of the single-phase "FL" meter have been made the basis for the whole of an up-to-date range of a.c. meter. The polyphase types "FLY" and "FLX" are for metering loads on 3-wire and 4-wire systems, respectively. The prepayment type "FLP" has a switch of the smallest dimensions, narrow break, large load capacity, and a very convenient price-change arrangement. The two new lines have been developed with the special aim of encouraging the use of electric heating in hotel bedrooms. The hotel type prepayment meter (illus. p. 220) is a development of the "FLP" model. Prominence is also being given to meter testing equipment and summation equipment with a maximum demand printometer.

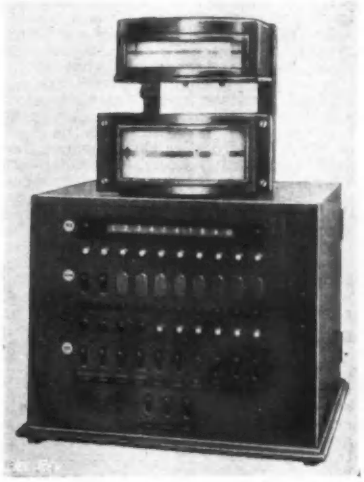
Indicating measuring instruments, relays, and instrument transformers are of excellent finish and have practically perfect damping, high torque, and high torque to weight ratio. Rectifying instruments employ a full wave copper-oxide rectifier, and for radio frequencies there are thermal instruments which are also particularly suitable when a true r.m.s. reading is required independent of wave form.

Complementary to a multi-range d.c. test set is a similar instrument for a.c., self-contained for measurements up to 600 V and 5 A, with provision also for using the instruments in conjunction with a current transformer.

With a representative selection of mains-driven electric clocks is a two-pin fuse-plug of a size to fit the standard 5-A socket which affords a convenient means for the wiring of the clock in any position.

Amongst other features of domestic interest will be the 7-valve super-heterodyne radio receiver, and a selection of radio components. A prominent position will also be occupied by thermal storage automatic electric water heaters, all of which are automatically controlled by thermostats.

Parabolic reflector fires are available in a large variety of designs, ranging from the small portable to the handsome flush type set in chromium-plated panels. Particular mention must also be made of the wall or ceiling type of fire, intended for downward radiation of heat; this type has found useful application in the heating of open-air schoolrooms, verandahs, and wards of hospitals, &c. A very recent application is the flood-heating of a section of the grand-stand on a football ground.



The control panel in the G.E.C. ten-point supervisory control system

The heavier exhibits will illustrate the general structural features of typical power transformers, on-load tap changing equipment, and mercury switch tap changing gear, which may be either hand-operated or motor-driven for remote control or automatic operation. The moving-coil regulator, either as a hand-operated or automatic unit, is an inexpensive means of compensating for voltage drop on supply feeders, particularly for rural electrification.

Ferry Engine Co., Ltd.

The Diesel engines made for arc-welding and lighting and power sets are of the medium-power high-speed (800 to 1,200-r.p.m.) type, with four cylinders cast in pairs. They are easily started from cold by hand, and all bearings and working parts have forced lubrication, the engine, flywheel, and reversing gear (when fitted) being all totally enclosed. These heavy-oil engines have a power-to-weight ratio equal to that of petrol-

paraffin engines of similar power, and their fuel consumption is about 0.42 lb. per b.h.p.-hour.

Thos. Firth & John Brown, Ltd.

One side of the stand will be devoted to "Staybrite" steel and examples of its manipulation in the hands of fabricators and manufacturers in many industries and trades.

The other portion of the company's exhibit will demonstrate its standing in the heavy-steel industry, and will include alloy steel castings for quarries and grinding mills. Among engineers' tools, the "Millenicut" file will be shown for the first time. The "Insto" inserted-tooth saw will also be shown in operation, and there will be demonstrations of "Nitralloy" steel and the nitriding process of hardening.

Foster Instrument Co.

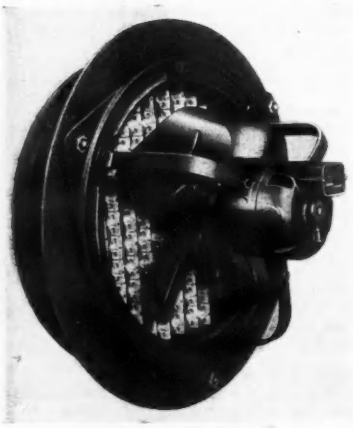
A complete range of electrical temperature measuring apparatus will include thermo-couple, optical and radiation pyrometers, and electrical distance thermometers. A new 7-inch chart recorder (illus.) incorporates a number of interesting features, including electric drive for both a.c. and d.c. mains. The timing in the a.c. model is independent of frequency, and both types will also continue to operate for a considerable time after failure of the supply current, thus obviating the possibility of lost records in the event of a fuse blowing.

The temperature line is produced by the "dotting" method, up to six records, each in a different colour, being obtainable on the one chart by means of a multi-coloured continuous ribbon and an automatic commutator which can be oil filled if desired. An important feature of this instrument is the fact that the standard chart speed of 15 mm. per hour can be set up to 60 mm. per hour simply by reversing the driving pinion.

In addition to the exhibits on its own stand, the Foster Co. will demonstrate electrical automatic temperature controllers on a number of electric, gas, and oil-fired furnaces in various parts of the exhibition. Of particular interest in this connection are the exhibits on the stands of Wild-Barfield Electric Furnaces, Ltd., and Birmingham Electric Furnaces, Ltd., where electric heat-treatment furnaces of the "air circulation" type are in operation, controlled by the charge progress recorder made by the Foster Co. This instrument automatically maintains the furnaces at any predetermined figure and in addition also indicates to the operator when the load has also reached the desired state.

General Electric Co., Ltd.

One of the main exhibits will be ten-point tandem supervisory remote control equipment (illus.) for small generating, sub-station, converting and distributing systems. A selective ringing telephone system for train control operates on the two-digit dialling system, which provides a capacity of 90 way-stations and is devised to enable the operator at the control station selectively to call any way-station over a two-wire circuit. A 25-line rural automatic exchange switchboard consti-



A G.E.C. air heater

tutes a two-digit exchange with connection by junction lines to one or more neighbouring main exchanges, and as many as four units can be combined to provide a capacity of 100 lines (90 subscribers' lines and 10 junctions).

A 30-kW electric furnace is shown in operation for the continuous bright annealing of brass strip, fitted with a water-cooling zone at the discharge end, and the temperature of the strip can be adjusted exactly and maintained automatically. For metal melting a model of a "Witton" high-frequency furnace (Stobie patent) is shown. The electrode boiler exhibited can be furnished for both low and high voltages, and is of a cylindrical, vertical type with riveted dome ends; the principle of its operation is that the water to be evaporated acts as a resistance between electrodes in the boiler.

A new and compact air heater (illus.) has a total loading of 6 kW and incorporates a 16-in. induction fan and adjustable louvres, which vary the angle of projection of the warm air from the heater, this being dependent to a large extent on the height of the heater, when installed, from floor level. Standard water-heating equipment includes pressure and non-pressure types, and cistern models.

The range of measuring instruments, ammeters, and voltmeters on this stand are the products of the Salford Instrument Works and closely associated with them are examples of loading coils and parts, relays, circuit breakers, etc.

A selection of the present standard range of "Magnet" cookers seems to cover all normal requirements; the thermal storage cooker has a prominent place in the display with "Magnet" hotplates.

The novel tiered lighting fitting which

A Gent electrically operated fire-engine bell

surmounts the stand is typical of the originality evinced in the more local illumination of other parts of the stand. The central pavilion has a false ceiling below the structural ceiling, and a number of reflectors are arranged above this in such a way that illumination is distributed from the back on to the surrounding ceiling and frieze. To supplement this an inverted reflector surmounts an island exhibit in the centre and throws concentrated light on the underside of the false ceiling, whence it is redistributed. Attractive lighting fittings are distributed about the stand with the recently introduced series of "Bakelite" torches.

Gent & Co., Ltd.

A new moulded "Bakelite" telephone with a push-button is now available for use with the company's "Regent" instruments. There is an electrically operated fire-engine bell (illus.), 10 in. across the mouth, and also a smaller pattern, 8 in., for police cars, ambulances, &c., suitable for operation with a 12-V accumulator. For similar uses, a 12-V motor syren is shown for the first time.

New "Electro-Matic" clocks of various designs are shown, and a "Pul-Syn-Etic" time transmitter controls the clock on the stand. Overhead wires connect a sub-transmitter fitted with relay "Reflex" pendulum control operated from a prime transmitter for use in buildings which are separate from the main building, so that if wires are carried away the time transmitters continue to operate. An electric turret clock, operated by a "waiting-train" movement, is controlled by the time transmitter on the stand.

"Tangent" flame-proof mining bells, and a new pattern flame-proof two-way mining pull are also on view, as well as magneto mining telephones, battery call telephones and iron-clad switchboards, electrically operated liquid level indicating and recording apparatus and alarms, consisting of a water-tight iron-clad transmitter suitable for fixing in the open over reservoirs, which operates contacts at every inch rise or fall of the water.

Gibbons (Dudley), Ltd., and Gibbons Bros., Ltd.

The principal exhibit is a working example of a Dressler muffle furnace for vitreous enamelling. During 1932 this

The Gilman "Multi-flex" pottery-grinding and polishing machine

company has built furnaces and kilns for such varied operations as carburising motor car parts, vitreous enamelling, bright annealing copper, annealing steel files, and firing earthenware pottery.

Messrs. Gibbons (Dudley), Ltd., exhibit representative examples of their well-known refractories, including sillimanite, carborundum, silica and highly aluminous blocks, bricks, and special shapes.

F. Gilman (B.S.T.), Ltd.

A new pottery grinding and polishing machine is the "Multi-flex" (illus.), designed for rubbing and polishing glazed ware and other enamelled surface faults and flaws. The work is carried out at low speeds and specially graded natural stone wheels and shapes are used. The final polish is imparted by the use of wood, felt, and other bobs. The machine has two speeds for rubbing out and polishing. The equipment is of a portable nature with a swivel mounted motor.

An entirely new design of pneumatic high speed grinder is intended for finishing dies, forgings, die-castings, "Bakelite," or any other material produced by the moulding process.

Up to the present "Skatoskalo" machines have been offered chiefly with the object of removing hard scale deposits from boiler, economiser, and other tubes and surfaces. The new "Skatoskalo" mechanical tube brushing machine is offered for those plants where there is little or no hard scale to remove, but where it is desired to brush through the tubes of steam boiler plant to impart a burnished finish to the interior of the tubes before the boiler is put on load. This plant will be particularly useful in electrical generating stations.

Whilst the standard machines for heavy scale removal embody 1½- or 2½-h.p. motors running at 2,800 r.p.m., the new brushing machine embodies a motor varying from ½ to 1 h.p., according to the class of work, running at 1,500 r.p.m. The usual type of flexible drive is embodied, together with wire burnishing brushes of various patterns.

Girlings, Ltd.

This company states that it has sold about 10,000 of its "Mosaic" fires, which were put on the market last season at half the usual prices, and that it is still awaiting its first order for repairs. Such immunity from defects and breakdown is ascribed to the exclusive use of good quality wire for the heating spirals fitted to these fires, which are all provided with patent elements mounted flexibly so as to eliminate the risk of breakage.

"Mosaic" fires are now being offered at still more attractive prices of from 5s. to 25s., in a new design of frame known as the "Silver Line" (illus. p. 228), which are finished in oxidised silver, or bronze, as a standard. The smallest is the 0.5-kW "Silver Baby," other ratings being ¾, 1, 2, and 3 kW.

Gittings & Hills, Ltd.

Decorative panels will indicate the applications of new "Fouramel" and varnishes, which need four hours for interior drying and eight hours for exterior

hardening; these materials are durable and are specially easy to apply. Textural designs are obtainable by the use of "Stip-plex" a super-plastic paint composition, while "Rockhard" synthetic vitreous enamels and lacquers produce finishes similar, but cheaper, to those obtainable by stove enamelling.

These specialities flux at the low temperature of 230 deg. F. for two hours; a hard vitreous-like surface is produced, which is light-fast, durable when exposed to most climates, and has exceptional heat-resisting and insulating qualities. "Tower" brand stoving enamels for conveyor and box ovens, and "Metalard" for tool and machinery finishes will be included.

Greenwood & Batley, Ltd.

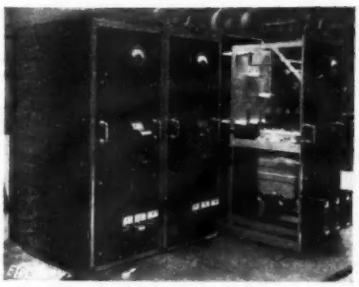
Here will be a display of machine-tools for cold forging and finishing rivets and bolts, and for screw making. There are also a 15-h.p. turbine and a 10-h.p. turbine fitted with ball bearings. A 1-ton "Greenbat" truck has an elevating platform, and is driven by a motor which is energised by an electric battery.

Grimston Electric Tools, Ltd.

Multi-purpose electrically driven tools are extremely useful in repair workshops. The "Duplex" combination machine will drill both large and small holes by means of two geared shafts at right angles, and the rotor shaft also drives a flexible extension shaft which can be employed for grinding and other odd jobs.

The motor can be mounted on a pedestal, is adaptable, and provides a range of speeds, from 210 to 32,000 r.p.m., in seven steps in the case of the No. 3 model. A large variety of accessory tools is available and stands are provided for drilling, screw feed, stroking for cylinder honing, valve refacing, etc. Bench and pedestal grinders are also supplied, and portable breastplate, hand, and pistol grip drills with a trigger switch held "on" by a button. Motors of from 0.5 to 2.5 h.p. with a switch and long flexible shaft for buffing, sanding, scaling, and similar operations can be obtained in a transportable form or, when floor space is limited, attached to a wheeled bracket for suspension from an overhead runway.

The machine casings are aluminium castings of the enclosed ventilated type with ball-bearing armatures; the gears are made of heat-treated nickel steel, and



Harland 300-A truck type switchboards incorporating "W.2" oil circuit breakers

the idlers run in ball bearings. The heavy-duty hand drill is reversible under control of the switch, which is incorporated in the tube handle, and fitted with drum-type contacts with quick make-and-break action. An earthing wire is provided and also feed-screw.

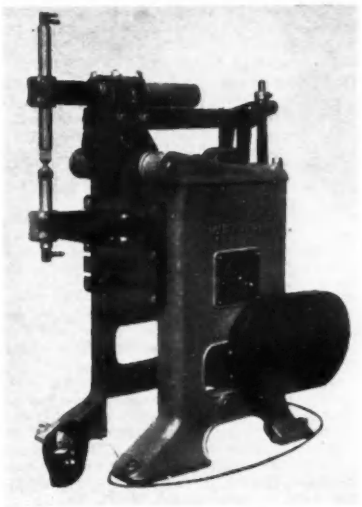
Guest, Keen & Nettlefolds, Ltd.

Built into this stand are seven massive glass-covered panels containing samples of hundreds of different kinds of screws, bolts and nuts, rivets, screw hooks and screw eyes, nails, &c. A large showcase has as its main design a Union Jack worked in actual screws. The company's trade mark is also worked in this panel and the words "Buy British" stand out boldly in large brass and black nuts.

Hague & McKenzie, Ltd.

This stand will be in the form of a model kitchen and demonstrations of hot-plate cooking will be given. Three square pans have been introduced for use on electric cookers; also a triple saucepan to fit an 8-in. hot plate, which should be particularly useful in small households. Each pan is of 2-pt. capacity and this means that soup, stew, gravy or sauce and two vegetables can be cooked at the same time on one hot plate.

An oval fish fryer, oval fish kettle, and an oval deep boiling pan are now obtainable and are cheaper than cast aluminium ware. Over 100 different sizes af utensils are specially made for electric



The Holden & Hunt "No. 5" continuous spot welder

cookers, and this company claims to be the largest maker of flat-bottomed pans for hot-plates.

Hailwood & Ackroyd, Ltd.

This company will have a large display of British-made globes and shades for pendants, wall brackets, and table lamps. Low as well as high-priced materials are available, comprising blown and pressed glassware in clear crystal, opal, and colours; also decorated with fast washable artistic designs. Chemical and heat-resisting glassware is also made, as well as metalware for electric lighting fittings and miners' lamps. Beautiful effects are obtainable with three-ply opal glass, which can be tinted with colours and built up into architectural shapes and forms.

Hall & Pickles, Ltd.

The chief items of electrical interest are nickel-chromium resistance alloys and magnet steels of the "HP" class. Fractures, photomicrographs, and samples of "Hydra" high-speed tools and of work done with them will illustrate the extensive range of steels of different characteristics manufactured by this company, including stainless varieties and oil-hardened non-shrinkable cast and alloy tool steels.

H. & C. Switchgear, Ltd.

Industrial and flameproof circuit breakers are completely metal-clad, everything, including trip coils, being oil immersed. The calibration tubes being under oil, there is no danger of rusting and consequent failure to trip. The contacts are of a special design.

Push button starter type "A.219" is new, and is fitted with a real contactor, capable of starting motors up to 15 h.p. at 660 V. It is very robust in construction and sells at a competitive price.

A new flameproof control unit for a.c. slip ring motors, type "A.237," comprises stator control, rotor control, protective devices, and provision for isolation, all contained in one heavy sheet-steel case. All internal connections are ready made, and the equipment gives increased convenience for inspection and maintenance and saves space; it is manufactured up to 120 h.p. at 660 V.

A flameproof gate end oil circuit breaker, skid mounted, comprises a 100 A oil circuit breaker fitted with B.S. plug. A special feature is the great facility with which the whole of the interior mechanism may be removed and replaced without disturbing the gate end box or cables.

Type "A.229" flameproof remote control gate end circuit breaker, air break, has a series isolating and reversing switch, all circuit closing and opening taking place automatically at the gate end circuit breaker.

Harland Engineering Co., Ltd.

Combinations of truck type and metal-clad switchgear include W-type oil-immersed circuit breakers (illus.), which are made up to 600 A, 11 kV, 250,000 kVA, with self-supporting framework and tank raising and lowering gear. The boiler-plate tank is welded and reinforced; it stands on wheels and has a domed top plate, ribbed, having a machined tank face, and two vents. The bushings are built up of wound "Bakelite" tubes around a long flange, which is bolted to the top plate. A brass sheath inside the "Bakelite" tube reduces ionisation of the air surrounding the terminal stem. A porcelain shield at the contact end avoids tracking by arc under the oil. The operating mechanism is of the free-handle type, and up to six trip coils of the armature type with air gaps adjustable by a cam arrangement inside the cover can be accommodated.

Two kinds of current transformer are made, namely, the wound primary with single or double secondary, and the single-turn primary ring pattern. Cores are built up of "Stalloy" insuline-coated stampings, and both kinds are available for air cooling or filled with compound or oil. Ring types are made with "Mumetal" cores down to a ratio of 40/5 A.

Other items are knife switches and isolators, for the assembly of which no cement is employed. A wing cubicle with oil-immersed isolators has four positions, namely, "on," "off," "earth," and "test," and is a suitable component of the "DW.3" metal-clad switchgear to form a convenient ring main unit.

G. A. Harvey & Co. (London), Ltd.

Specially designed plant for the canning and other industries is now manufactured by this company. There is a comprehensive exhibit of perforated metals and woven wire used for the screening, grading, sifting, or filtering of diverse materials. The company produces woven wire in all meshes and gauges, the "Harco Metalace" being a new achievement in wire-weaving. This new material combines durability with artistic effect, and is eminently suitable for grilles, ventilator panels, radiator covers, &c. Gilled tubes are of particular interest to all concerned with heat-transfer problems in connection with ventilating, drying, heating, cooling, and electrical equipment.

W. T. Henley's Telegraph Works Co., Ltd.

Here will be a display of the company's Engineering Department manufactures and not a cable exhibit, but some samples of cable and wires are to be shown. An illuminated pedestal show case will contain typical mounted sets of "Isco" cut-outs (both ironclad and insulated types), and above these tiers of neutral connector boxes, &c., mounted close together row upon row will suggest "mass-production" methods. Surmounting them, picked out by floodlights, there will be giant models of ironclad, insulated and outdoor "Iscos."

Examples of tier-type terminal boxes will be mounted on wooden pole tops, complete, and connected to short lengths of overhead conductors with the usual shackle-type insulators. Line taps, both "nut" and "vice" types, are to be displayed on two decorative panels, together with specimen fuse taps, whilst an entirely new line is an improved pattern pavement frame and cover. The construction is particularly light and most unobtrusive when set in the pavement, yet it possesses great mechanical

The new insulated sealing chamber for use with insulated "Iscos"

strength. Another feature is the special formation of the flanges to prevent trouble due to the entrance of foreign matter at the joints.

Several specimen compact-type link-disconnecting boxes will be included, as

well as cablegrip joint boxes, inverted-type h.v. terminal boxes (outdoor type), and other electrical distribution equipment. A large section of the stand is to be devoted to the "Solon" electric soldering iron.

Early last year Henley's announced a new range of insulated "Iscos," but the sealing chambers supplied for use with them were of cast-iron. Sealing chambers of insulating material (illus.) are now available for d.p. or t.p. 30- or 60-A sets and neutral connector boxes. They consist of two identical Bakelite mouldings forming the back and front, held together by screws. The design is of the triple-entry type; a moulded bush is provided for use in one entry, whilst presspahn discs serve to blank off the other two. A novel feature is that the sealing chamber has an open top on to which a reversible cover plate may be fitted. By this means a number of arrangements are possible.

Alfred Herbert, Ltd.

An "Atritor" unit coal pulverising machine firing a forge furnace will be a working exhibit demonstrating the advantages and economies of mechanical firing by pulverised coal. A full-size model shows the method of firing Lancashire boilers and the special type of burner used.

A working model of the Henrez-Modave patent dust arresting and de-sulphurising plant for the purification of flue gases will also be shown. This plant has proved highly efficient in preventing the emission of dust and sulphur fumes, which are caused by burning pulverised coal. Another exhibit is the Boby precipitation plant (Andrews system), by means of which the solids carried away by water used for flue gas purification and similar purposes are precipitated in the form of sludge. The overflow is clarified to a high degree of purity and may be used again.

Higgs Motors, Ltd.

A comprehensive range of manufactures includes 2- and 3-phase induction motors of the squirrel-cage and slip-ring

An ingenious display of Girlings "Silver Line" fires

types, and single-phase motors of the split-phase and repulsion-start induction types; also d.c. motors and fixed and variable voltage generators. In addition there are various adaptations and combinations, such as motor generator sets, flange mounted motors, polishing motors, battery charging sets, back-geared machines, &c. The company makes a very wide range of machines from ½ to 50 h.p. and many of the standard machines can be adapted for special purposes and applications.

For those interested in the manufacture of electric motors the company is to maintain a service of cars from its stand to the head office and works at Witton.

Hoffmann Manufacturing Co., Ltd.

Among this company's selection of anti-friction ball and roller bearings for practically every engineering need there will be a set of bearings for a 240-h.p. railway traction motor and also a sectional model of a tramway roller bearing axle box showing the special method adopted for mounting the bearing. "Duplex" ball bearings are capable of taking both journal and thrust loads, the latter from either direction.

Patent "sun and planet" friction eliminators offer to straight-line motion the same service as the usual types of ball and roller bearings do to rotary motion. There are several variations in design, some of the modifications giving a caster effect which allows of multi-directional movement. This product has only recently been placed on the market.

Steel balls and rollers are to be shown in addition to complete bearings, and one noteworthy item will be a small tube containing 40 gross of steel balls not larger than 1/32 in. in diameter. Line-shaft bearings will also be in evidence.

Holden & Hunt

A very complete range of electric resistance (low voltage) welding machines, of the spot and butt types, includes a number of new models. The No. 6 foot-operated spot welder is of the universal overhung type and capable of heavy duty; it is of 40-kW capacity and is fitted with an automatic trip switch. All levers and foot pedals are steel castings, and a specially arranged toggle gear is fitted to give extremely heavy pressure on the weld, also to give a large opening at the electrodes. Arms of varying lengths can be fitted with water-cooled electrodes and renewable tips.

The No. 5 power driven continuous spot welder (illus.) is fitted with a self-contained motor drive, which, through gears, drives a clutch shaft operated by a remote Bowden wire pedal in such a manner that single or continuous welds can be obtained. The machine is of 30-kW capacity and the current to the weld is controlled through a contactor switch operated by the clutch shaft.

A small bench type machine has been developed for the spot-welding of dental plate parts in stainless steel. Regarding electrode tips, special cadmium copper, which gives a life of eight to twelve times that of copper, can be supplied in various square bar sizes or made up into tips.

J. H. Holmes & Co., Ltd.

This company will be displaying motors for many different purposes, including induction, totally enclosed, fan-cooled, variable-speed commutator, and coal-conveyor motors, all of which are for a.c.

The totally enclosed fan-cooled motor is built on the twin-case principle, with an annular space between the inner and outer casings through which cooling air is driven by a fan mounted on the end of the motor-shaft. The commutator motor, which is of the series-characteristic type, is one of a range specially designed to give efficient speed control, including also commutator motors with shunt characteristics. Speed regulation is effected by moving the brushes round the commutator manually by a hand-wheel, or remotely by a small pilot motor, and can be designed under suitable conditions for speed ranges as high as 12½ to 1. A coal-conveyor motor has a plain cylindrical exterior so that it can be rolled along the roadway with the minimum of effort, while a specially designed welding generator can be coupled to an a.c. or a d.c. driving motor or to a petrol engine.

Holmes's unit-type air-break metal-clad switchboards are designed for floor or wall mounting, and provide a simple and inexpensive means of control for general industrial purposes. The units are made for current ratings ranging from 30 to 350 A at 660 V, and include bus-bar chambers, fuse boxes, switches, circuit breakers, and cable sealing and dividing boxes.

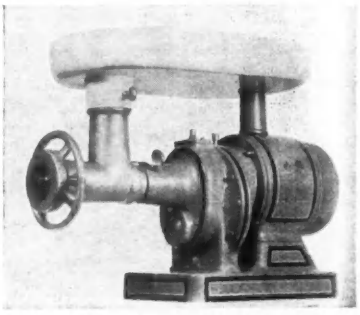
In conjunction with Messrs. Reyrolle the company has been manufacturing automatic electric traffic-control apparatus for some time. Another particularly

A Klaxon geared motor unit

interesting exhibit is an example of a very recent development designed especially for testing boiler tubes by measuring their thickness.

Hoover, Ltd.

The new "Model 900" vacuum cleaner is designed for use in hotels, theatres, clubs, public buildings, churches, apartment houses and large homes, and is constructed to withstand all manner of abuse arising from strenuous employment, careless handling and abnormal use. It is equipped with a ball-bearing motor that requires no oiling. The two speeds of its motor—6,700 and 5,600 r.p.m.—are a great advantage, the low speed and consequent lower suction be-



A "Crypto" meat chopper

ing most suitable for lightweight flexible carpets, whereas heavy, stiff, long piled carpets require the additional suction and agitation produced at high speed. A new feature in connection with the bag is a rubber gasket to compensate for surface variations at the point of connection with the main casting, thus eliminating leakage. The new model is practically the same size as other Hoover models, but a little heavier. Its retail price is £29 8s. complete, or £26 5s. without dusting tools.

Hotpoint Electric Appliance Co., Ltd.

One of the Hotpoint-B.T.-H. cookers (illustrated, page 223) is particularly suitable for a family of four to six people. It is fitted with "Torribar" boiling plates and oven-heating elements, and this model is finished in mottled-grey vitreous enamel, with white panels to the oven and grill doors.

Among electric vacuum cleaners, the popular "Junior" and "Duplex" models retain the well-known beating and sweeping action, coupled with exceptionally powerful suction developed by a motor specially manufactured by the B.T.-H. Co. Both these models are now made entirely in England.

The "Gem" fires are still finished in either grey, blue, brown, or old gold porcelain enamel. They can be supplied with either 1- or 2-kW loadings, and a range of bowl fires in attractive colours will also be shown. The lightweight iron, weighing only 4 lb., will also be of considerable interest, a special feature being the patent flex support (see last week's issue, p. 198), which is supplied free of charge.

The company has been able to effect reductions in the prices of super-automatic electric kettles, finished in either polished copper or nickel plate. The Hotpoint-B.T.-H. immersion heater makes hot water available at any time. The sales of electric washing machines are steadily increasing. Attractively finished in dove-grey enamel, they fit in with the surroundings of any kitchen, and take up little space.

Thomas Howse, Ltd.

Air-drying stoving synthetic resins will include "Infuselax" finishes for electric heaters. There will also be the "Ferret" brand of stoving japans; steel, heat-resisting, acid-proof, and anti-fungoid enamels; and paints of all sorts. New industrial and decorative designs are obtainable in crackle lacquers and prismatics.

Imperial Chemical Industries, Ltd.

A special feature is being made of the "Dulux" range of finishes and of "Nobel" low-bake and heat-resisting enamels, all of which have a synthetic base. The former includes air-drying and stoving finishes for brush and spray application by the roller coating process. Tin strips finished with this material will, after two months, withstand bending and folding without the film being broken or impaired.

"Nobel" heat-resisting enamels are synthetic and were developed particularly for decorating fires. Models already painted can be refinished with these enamels in any shade by the application of one coat only of enamel. Besides

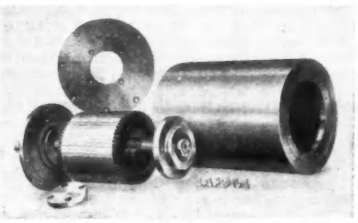
straight colours, fancy effects are obtainable which will not discolour under prolonged heat nor will they chip or crack with age. "Belco" and "Necol" cellulose finishes are for the decoration and protection of metal surfaces and are quick drying.

Imperial & International Communications, Ltd.

A large map of the company's telegraph system will be mechanically illuminated with red lines in such a way as to create the effect of messages being transmitted over submarine cable and wireless routes. Two model beam wireless masts are surmounted by flaring beacons, and there is also a model of a deep-sea cable-repairing ship. Telegrams will be accepted on the stand and telephoned to the head office.

India Rubber, Gutta Percha & Telegraph Works Co., Ltd.

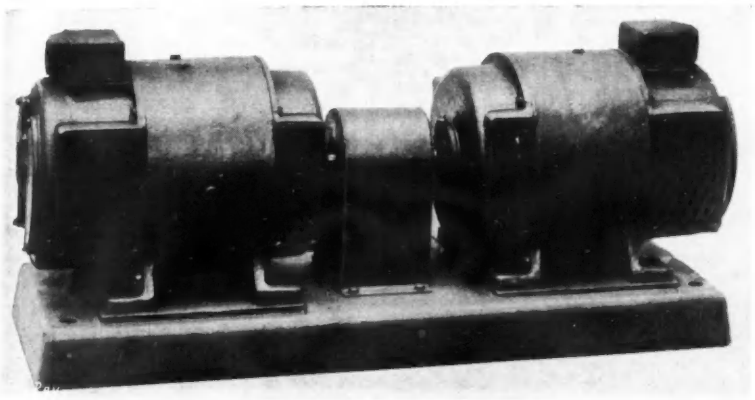
Chief among a display of mechanical rubber, ebonite, gutta percha goods, primary batteries, and electrical instruments will be rubber and canvas conveyor and transmission belting, with raw edges, which is able to withstand fork wear to a remarkable degree. All kinds of stream and suction hose and tubings will be shown, and "Silvertown" rubber flooring will cover the whole of the stand floor space.



A Laurence, Scott & Electromotors "Rolling" squirrel-cage motor

switches, wiring, etc., at the back of the cooker. Cast-iron construction has been adopted for the hot-cupboard. The "6D" double-oven electric cooker will represent hotel equipment made by the company.

Electric washboilers are of two types, one being fitted with two foot press switches mounted through the outer case of the boiler for transportability. The other type is supplied complete with 4-core cable connected to a 3-heat switch



A "Castle" motor-generator set (J. H. Holmes & Co.)

Numerous examples of moulded rubber goods and ebonite include battery and accumulator boxes, rod and tubing, and metal-covered ebonite. An item of interest to those engaged in the chemical and allied industries is a metal centrifugal pump lined throughout with ebonite.

Dry batteries and inert cells, pocket light and torch batteries will be shown, in addition to Leclanché cells, Bunsen, Minotti, Daniel, and bichromite batteries, while the new "Silver Knight" h.t. and grid bias batteries will be prominently displayed. Telegraph and testing instruments and water-level apparatus will be demonstrated.

Ioco Rubber and Waterproofing Co., Ltd.

The electrical insulating materials made by this company include "Formapex" micarta products ("Bakelite" type) such as boards (cloth and paper), tubes, gear blanks, interior panelling, varnishes, and treated paper, as well as "Linapex" insulating cloths, silks, and tapes, cable cotton, oiled papers, slot insulation, and adhesive tape.

Jackson Electric Stove Co., Ltd.

Domestic electric cookers, embodying a complete range of the "60" series and also of the "91J" series, together with two new models, "94J" (illus.) and "95J," are fitted with plug-in type elements throughout. The new models follow generally the specification and construction of the "91J," but they are of larger types. They are both of the same dimensions and capacity, with the exception that the "95" model is fitted with an extra boiling plate in the hob. The "94J" is suitable for a household of 5-7 persons and the "95" for 7-10 persons. They have side heat only in the oven, instead of side and bottom heat as previously. The new design of grill boiler is a considerable improvement on the previous models and the top plate is constructed of special metal, the top of which is machined flat, thereby increasing the speed of boiling considerably. Remote control switches are also fitted, with a view to reducing the minimum overall width of the cooker. This method of assembly gives easy access to the

on a block for permanent wall fixing. Thermal storage water heaters have been designed in conformity with the E.D.A. Water Heating Committee's recommendation.

Richard Johnson & Nephew, Ltd.

Interesting features of this exhibit will be specimens of steel-cored aluminium conductors, both round and segmental; copper and cadmium-copper transmission wires, and wires for widely differing purposes made of aluminium, copper, bronze, iron, and steel. The company claims to have supplied the greatest mileage of conductor for the grid, and it has manufactured multi-ply wires from 7-ply to 61-ply, several of these different constructions being on view.

The advantages of "Crapo" galvanised wire will be graphically shown. This process permits a heavy deposit of spelter, which is unaffected by hammering, bending, twisting, and general heavy usage. Great economies in maintenance costs can, it is said, be effected by the use of wire galvanised by this process.

George Kent, Ltd.

Among meters and control apparatus of almost every kind for every branch of fluid metering, one of the most interesting is the master control panel as used on the automatic boiler control system evolved by this company. A complete set of this equipment was recently installed at the Hackney power station. A range of panel-mounted instruments for boiler houses includes combustion efficiency meters, boiler feed meters, steam flow meters, temperature recorders, pressure recorders, draught gauges, &c. Another item of interest is an example of telerecording meters.

The temperature, pressure, and flow controllers exhibited have not been shown at this exhibition before. A range of steam, water, air, oil, and gas meters, and the well-known "Venturi" meter, which is used for the bulk measurement of fluids of all kinds, complete the display.

Klaxon, Ltd.

A representative selection of models of the wide range of motors and geared motor units (illus.) produced by the company will be shown on this stand. All fractional h.p. motors are available in universal shunt, split-phase, shaded-pole, &c., models. A ¼-h.p., 230-V, 8,000-r.p.m. motor weighs 13 lb. and costs 75s. For film projector work a combination has a geared unit which can be set at any angle to the motor. A unit with a double-ended spindle on the gear section has its gear case integral with the motor end bracket.

For window display work there is a unit with the motor bracketed on the gear box. It has a torque of 14 lb.-in. at 6 r.p.m., and will carry a dead weight of 35 lb. A 1,300-r.p.m. motor is the driving component of a unit with output speeds of 16, 25, 50, and 80 r.p.m. (double ended spindle) through a single worm reduction; it costs 70s. A sewing-machine motor to be shown in conjunction with a foot operated regulator has "Bakelite" end covers. Industrial syrens will include a flame-proof equipment measuring 5½ in. by 7 in. dia., and costs for 6 and 12 V £4. A 110-V d.c. model is loaded at 0.45 A. There is a working model turntable used for display, and a working model of a motor in section.

The company's staff locator will be seen working in conjunction with visual signals.

Ley's Malleable Castings Co., Ltd.

An imposing array of "Black Heart" malleable castings will embrace typical examples for various branches of industry, large chassis parts for commercial vehicles, odd-shaped parts for textile and agricultural machinery, connecting rods for stationary engines, and hundreds of other parts. Particular attention is directed to the tests which will demonstrate the machinability of "Black Heart" malleable iron.

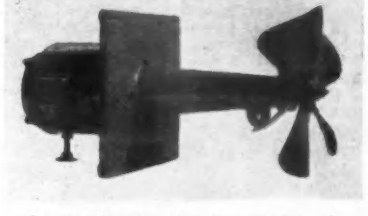
Lancashire Dynamo & Crypto, Ltd.

Since it commenced to make food-preparation machinery this company has produced various sizes of meat choppers (illus.) and sausage-making machines, coffee mills, and vegetable peelers and washers, a field formerly held almost entirely by the foreign manufacturer; furthermore, the machines are being sold direct to the user at competitive prices.

Model "1933" domestic refrigerator is new. The cabinet is porcelain lined throughout with an all-white cellulose exterior finish on steel panels. All exposed hardware is chromium plated. The storage capacity is approximately 4 cu. ft.

Two models of electric hand and face dryer are made, one for permanent fixture against the wall, the other one a pedestal type, and transportable. The machines are finished in white cellulose and are operated by a quick make-and-break foot switch. The loading, including heating element and motor, is approximately 2.4 kW.

Cinema arc rectifiers are made in sizes from 30- to 300-A output and are suitable for operation on any 3-phase supply, capable of overloads up to 100 per cent.,



A propeller-fan for fume-laden air (Midland Fan Co.)

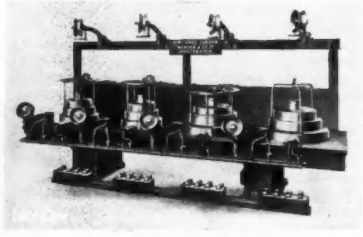
and are provided with a secondary voltage of 70-80-90 or 90-100-110 V.

"Langham" geared-motor single, double and triple reduction (1,420 to 15 r.p.m.) units are shown, the double reduction units incorporating a totally enclosed gasworks type d.c. motor. Flameproof barrel type mining motors have been type tested at Buxton; cartridge type bearings are fitted to all sizes except the smallest. A very complete range of fractional h.p. motors includes repulsion and squirrel-cage types for a.c. mains, and also d.c. motors from ⅛ h.p. upwards.

Laurence, Scott & Electromotors, Ltd.

One of the newest products will be the "H.M.S." compensator for power factor correction. The Burke-Scott arc welder is stated to be the only welded welder; it has no exciter, elaborate switchgear, or "gadgets." The control of the arc is entirely automatic, the stabiliser providing a constant non-spluttering arc, even when bare electrodes are used. The "Emcol" welded steel frame motor is totally enclosed for use where dust, fluff, water, gases, or fumes are present.

A cylindrical barrel pattern (illus.), which can be rolled into position, is available with a built-on starter and is very suitable for mines and oil and chemical works where a flame- and explosion-proof machine is required. These and the standard industrial motors are all of the steel-frame construction built up by electric welding.



Model "G.M.I." wire-drawing machine (Sir James Farmer Norton & Co.)

Marine starters of the drum and cam-contactor types are made for both deck and bulkhead mounting. The "metal and mica" principle of insulation used throughout makes all parts clearly visible and accessible from the front by simply opening the door. Inching is a feature combined with the slow-motion handle, and all standard starters except the smallest have a double-pole contactor circuit breaker with magnetic blow-out on each pole, definitely interlocked, and the resistances are metal tubular units cooled both inside and out.

The simple mechanism of the "L.S.E." street traffic control equipment does not need a motor to operate it. The switchgear is robust and has self-cleaning contacts, all the controls being housed in the base of the lamp-post. The time cycle is adjustable without altering the road ratios.

Mavor & Coulson, Ltd.

A prominent demonstration in the "Quarry to Road" Section is the discharging of a stream of gravel at eight feet above the ground by "Joy Loading." The source of the stream is two gathering arms, of the M. & C. "Joy Loader," sweeping the gravel on to a front conveyor. The stream issues from the end of a second conveyor, in the rear, and lands exactly where the operator wishes. The loader propels itself and is handled by one man. The capacity of the type shown is 2.2 cu. yd. per minute (1½ tons of coal per minute), but a larger machine is also available.

M.C.L. and Repetition, Ltd.

These makers of motor-car lighting equipment are also producers of metal parts turned by automatic machine tools, such as nuts, bolts, screws, terminals, sockets, and unions, grease cups, nipples, and guns. Milling, drilling, capstan, and assembly work is also done for the electrical and general engineering trades in various metals.

Meldrum's, Ltd.

The chief item of interest will be a sprinkler mechanical stoker of the fixed grate pattern, which will be shown attached to one flue of a Lancashire boiler. Alongside will be a set of moving bars and also a hand-rocking grate, with which the stoker can be provided to suit the particular fuel being used. The stoker is driven on the unit system, so obviating overhead shafting. Smoke eliminators for Lancashire, vertical, and locomotive type boilers can be used with forced as well as natural draught.

Midland Fan Co., Ltd.

Among fans, blowers, and exhausters for ventilating, heating, drying, and conveying systems is a new electrically driven propeller fan (illus.) which is being specially made for use where the driving motor must not come in contact with fume-laden air. The motor drives the fan through an extension shaft with an out bearing, and the unit can be so fixed that the fan will deliver air from any required point and discharge it through a suitable duct without any chance of the air reaching the motor. A totally enclosed motor wound for 400 V, 3 phase, 50 cycles, driving a 12-in. fan will move 1,550 cu. ft. of air per minute.

Paint-spraying equipment is made also. The standard "B.F." combination flat or cone-shaped sprayer pistol is used for finishing electrical gear and for spraying insulating varnish into inaccessible parts.

Moler Products, Ltd.

Heat insulating materials will include "Fosalsil" solid and porous bricks, powder, aggregate, plastic composition for lagging steam pipes, and mortar for making heat-tight joints. One exhibit will show "Economite" insulating concrete and bricks behind refractory material, the cavity between the insulation and the common brick exterior wall being filled with powder which has the low thermal conductivity of 0.57 B.th.u. per sq. ft. per hour per inch thickness per deg. F.

H. G. Moseley & Co., Ltd.

All the imitation coal fires in the "Eddo" range of domestic appliances are now made to produce a moving flame effect, and the appearance of the "Eddoglo" has been materially improved. The "Service" fires are now loaded to 1 and 2 kW. and retail at 8s. 6d. and 16s. 6d. respectively.

A new model is the "Panel," which is mounted on an insulated panel, heavily enamelled in grained wood and other finishes. It will be shown in 2- and 3-kW capacities, finished in chromium plate. A new bowl fire, No. 270, which retails at 8s. 6d., is fitted with a 10-in. solid copper reflector. The bowl pivots on a modernist pedestal, using a 550-W parallel type element.

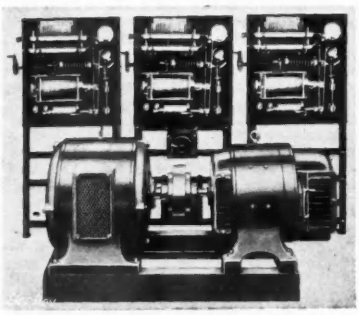
In addition there is shown for the first time the new "Eddo" electric vacuum cleaner.

Moulded Products, Ltd.

A display of plastic mouldings illustrates the possibilities of this relatively modern craft, particularly in relation to the electrical industry. The range of moulded electrical components is comprehensive, of particular interest being the moulded "Bakelite" components of the Siemens wall telephone set. Seven separate and distinct mouldings are used in this assembly, and the finished set is extremely neat and serviceable.

Murex Welding Processes, Ltd.

This concern is an amalgamation of Alloy Welding Processes, Ltd., and the Premier Electric Welding Co., Ltd. It produces electrodes suitable for all kinds of special steels, and special interest will be taken in the new "Fastx" electrode for high-speed welding. Another, known as "Hardx," is specially manufactured for the hard surfacing of metals. The Brinell hardness of the weld metal deposited from this electrode is from 640 to 670. No quenching or other treatment is



Peters three-operator "K-5" welder

required to obtain this high figure, and the nature of the deposited metal is such that a very smooth and even surface is usually obtained during the welding, thus avoiding any subsequent grinding operations. Special electrodes for welding thin sheets are also available.

With a three-phase transformer or generator and by means of the "Poly-arc" winding machine, a welder can operate two electrodes. There is now on the market a "Murex" three-phase static transformer, portable and self-contained, made to suit any voltage, serving one or two welders, which costs very little more than an ordinary single-operator machine. It can also be used for welding very thin sheet metal and for cutting in. Another type of machine specially designed for welding thin sheet metal is a motor generator designed to supply each operator with from 10 to 30 A in steps of about one ampère. This set can also be used for heavier work if desired by connecting two or more circuits in parallel.

The bend test has become popular as a rapid and inexpensive method of determining the ductility of a weld joint, and a hand-bend testing machine will be shown in operation.

National Time Recorder Co., Ltd.

Clocks and recorders for time-keeping and costing are available in several types, such as the card, radial, "clipit," key, and autograph, which is also made portable. These machines can now be fitted with synchronous motors for plugging in to a.c. frequency-controlled mains. Self-winding transmitting master clocks and dials are also supplied for a.c. or d.c. mains drive, or dry battery operation.

Northern Rubber Co., Ltd.

Items of an electrical nature will be switchboard mats; insulating gloves, which the company will supply tested to 20,000 V; special cable sleeves, various types of gaskets, washers, etc., for making joints in connection with electrical apparatus; rubbered textile fabrics, hose, and belting; vulcanised rubber, and waterproof cements.

Sir James Farmer Norton & Co., Ltd.

Multiple wire drawing is more economical than the single-holing process. By drawing continuously through model "G.M.I." (illus.), for instance, each block of which is driven by an individual motor, the various stages of reducing mild and high-carbon steels are done

A "Pneulec" foundry machine

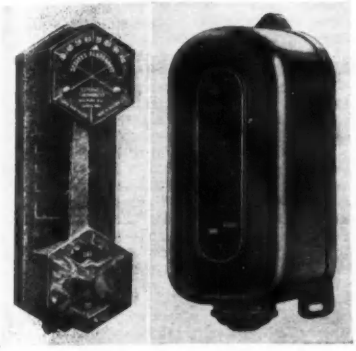
simultaneously, the rod being broken down at the same time as the wire is finishing. Unnecessary handling during processing is entirely eliminated, and almost continuous production is obtained by welding the rods before entering the first die. An efficient cooling system ensures that the synthetic dies and blocks are always perfectly cool.

Mild steel and high-carbon steel made by the wet process of drawing are superior in finish and quality to those obtained by dry drawing, but owing to extra cost involved this method has not been universally adopted, except for the highest grades of wire. Continuous drawing has been confined to two or three holing until recently, but the company has now introduced a self-contained machine which can be threaded up in the horizontal position for convenience, and swung into a vertical position when drawing. Its main advantages are that the drawing cones and dies are completely submerged in a trough containing liquor, and pumps for cooling the dies are eliminated, the cleanliness of the dies being due to the turbulence of the liquor, created by the revolving drawing cones. Owing to the constant cool state of the liquor, the quality of the finished wire is homogeneous, and with mild steel wire almost continuous production can be relied upon.

C. H. Parsons, Ltd.

A full range of front-entry rectangular switchplugs, ten models in all, will be shown for the first time; these units are of high quality and are exceedingly well finished. Of equal interest are the "Little Briton" switches, which attracted attention when they were introduced in September last on account of their shape; these will now be shown in

flush type, with plates of attractive and unique design. The range of end-entry quick make and break switchplugs has been further extended by the addition of double-pole models, which are available in 2-pin and 3-pin types. The "D"



Two "Satchwell" room thermostats, types "K" and "N"

shape, "easy-to-wire" plug top, which was introduced at the last Fair, is now available in the 15-A size. A comprehensive range of tumbler pattern and quick make and break switches, switch plates, ceiling plates and lampholders will also be on view.

G. D. Peters & Co., Ltd.

By reason of the special design of the type "S" welding generator and control gear any desired current up to the capacity of the machine can be obtained with automatically correct arc voltage for any electrode which may be used. The generator is exceptionally cool running and voltage recovery is rapid, so that vertical and overhead welding can be accomplished as satisfactorily as flat welding.

The type "K-5" equipment (illus.) for production welding is supplied in multi-operator units in various sizes so as to accommodate from two to six welding points. A control panel prevents interference between operators.

Model "203-WS" type "S" stationary motor-driven plant has a welding range of 30 to 250 A and will accommodate welding heads up to a length of 2,000 ft., while model "203-WP" is model "203-WS" adapted as a portable unit, driven by a petrol engine; the latter plant is extremely robust, but at the same time is light in weight. A Diesel-engined model with type "330-W" generator is adapted as a semi-portable unit, and another model—type "K-5" low-voltage production machine—will accommodate three welders, each having a maximum of 175 A.

Pneulec, Ltd.

Among foundry specialities the jarr rollover machine (illus.) is being demonstrated for the first time. It is the smallest of a range, has a turnover plate 20 in. by 36 in., and a maximum rolling over capacity of 750 lb. It is quick operating, and will make a complete cycle of operations—jarring, rolling over, and drawing the pattern—in one minute. All operations are oil controlled, and movement is always perfectly steady and positive. A rotary valve controls the operations, and when the machine is equipped with gravity roll-off and length of roller conveyor as shown in the illustration, the operator does not have to handle the finished mould from the machine. Where equipment is suitable, arrangements may be made for the production of two half moulds each operation. Pneumatic clamps may be fitted to hold the turnover board and mould during rolling over.

A sand mixing mill is also demonstrated for the first time. This is both a milling and mixing machine, and differs from earlier mills by the incorporation of the beater idea and mechanical construction generally. It has a runner for milling and beaters for mixing, which impart a constant agitation to the sand, being positively revolved in their travel around the pan.

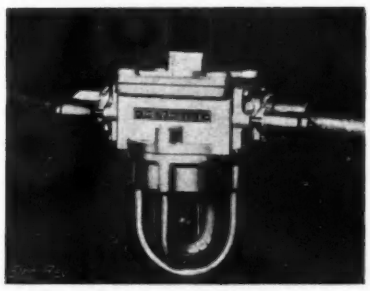
The magnetic moulder operates direct from d.c. mains, and the solenoid principle of operation makes possible a very simplified construction. There are very few moving parts, with an entire absence of valves, glands, packings, pipe lines, &c. The SS.324 model has a rating of 1½ kW. Power is consumed only while actually squeezing, no power being required for drawing the pattern, which is stripped from the mould on the return stroke by gravity.

Record Electrical Co., Ltd.

The main feature will be a new featherweight ohmmeter test set. To distinguish it from the larger models it is known as the "Minor" insulation test set. The standard instrument is wound for 500 V with clear open scales reading 0-20 megohms and infinity. The generator and indicator are combined in a moulded Bakelite case fitted with a carrying handle and metal cover. The height of the case is designed to allow full swing of the generator handle. The terminals are protected, yet accessible. The weight is only 3¾ lb. and the size 5⅞ by 4¼ by 3½ in.

The complete series of the larger insulation testers includes the standard light-weight ohmmeter, scaled reading up to 100 megohms and higher ranges up to 1,000 and 2,000 megohms, with constant pressure generators. Another interesting test set is the "Cirscale" workshop pattern ohmmeter, which has a 16-in. clear open scale, and is direct reading.

For conductivity testing the company has developed a special instrument of the "Cirscale" pattern, designed to employ a heavy testing current. The scale is very open up to one ohm, and readings up to 5 ohms can be taken. Other portable instruments are standard moving-iron and moving-coil ammeters and voltmeters, and an a.c. voltmeter employing



A lamp fitting used in the Reyrolle coal-face lighting system

a special movement with negligible frequency errors up to 1,000 cycles. The change-coil portable test sets are provided with five ranges from 1-750 V and six ranges from 1-600 A inclusive.

Electrical tachometers comprising an indicator and transmitter are made in three types, the lightweight for aircraft, the general purpose and watertight pattern for ships. Two types of indicators are supplied—the well-known "Cirscale," having a circular scale like that of a clock, and the edgwise pattern, which is designed for compactness.

Revo Electric Co., Ltd.

Samples of some of the most recent examples of street-lighting fittings include the "Westminster" fitting, which has been used in over forty-three miles of London streets.

Foremost among domestic appliances is the range of improved "Economy" electric cookers. Three additions to this range are to be shown, and comprise the No. 0, No. 3, and No. 5 cookers. The new "Superspeed" boiling plate will again be demonstrated in various models, and standard "Revo" cookers will be seen. Other items are a variety of fires, irons, toasters, kettles, immersion heaters and tubular heaters, while a new range of electric wash boilers will be shown for the first time. Several finishes are available, and the boilers may be equipped with "Revo" or "Chromalox" elements, with or without automatic safety devices.

In the "Quarry to Road" Section, traffic and road sign equipment will include signals of 8- and 12-in. diameter lenses, electrically illuminated "Keep Left" signs, and switch and fuse-gear.

A. Reyrolle & Co., Ltd.

Although switchgear will take the most prominent part, the company's water-heating activities will be strongly represented. A model of some 132,000-V outdoor metal-clad switchgear is an exact replica of equipment supplied to the Central Electricity Board. A typical horizontal draw-out metal-clad switch-panel is also shown, as well as an example of the "turbulator" contact, which is of the "boxed" class.

A working diagrammatic representation of the 1,500,000-kVA short-circuit testplant is arranged in sections to show the various parts and the connections, and neon lighting gives the impression of actual operating conditions. Automatic protective and remote-control equipment is represented by a complete control board ready to go into commission for controlling some 66,000-V switchgear, as well as some centrovisory-control equipment with tallygraph and tallymetering apparatus.

For outdoor sub-station service the now well-known Reyrolle ring-main tee-off isolator is shown in a special combination, which comprises a ring-main isolator, a tee-off switch-fuse, and a small power-transformer, the arrangement being such that cables between the switching-equipment and the transformer are entirely eliminated. Pole-line switchgear improvements include facilities for fitting a plug-isolating device and an earthing-switch, which can be self-contained in each unit.

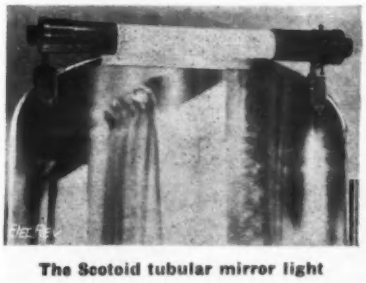
There are new examples of air-break and oil-break switchgear for mining and industrial purposes. Among the company's large range of small pedestal-mounting and wall-mounting switchgear for general industrial use, a recently designed quick-make-and-break switch for direct-on motor-starting is of interest. An air-break gate-end contactor-type switch has been recently designed for controlling coal-cutters, conveyors, loaders, and kindred apparatus in mines, while another similar unit houses a transformer and is designed particularly for controlling coal-drills and other low-voltage apparatus, including coal-face electric lighting equipment designed to take the place of battery-operated hand-lamps and oil-lamps (illus.).

A useful portable fitting for outdoor lighting is in the form of a multiple plug coupler, with a number of British standard sockets housed conveniently together to take plugs connected in any required way to lighting points. Domestic plugs and sockets of the protected type, an electric service-table, with only one incoming trailer cable for a number of appliances, and an electric iron stand incorporating a press-switch that cuts off the supply when an iron is placed on the stand; thermal-storage water-heaters, and a "Reymez" combined water-heater and pedestal wash-basin are items worthy of special notice. A low-voltage electrode water-heater has ingeniously designed means for obtaining load-control up to 1,000 kW at low voltages and up to 2,000 kW at voltages up to 11,000 V.

Rheostatic Co., Ltd.

This display will include automatic temperature control devices of the "Satchwell" thermostat type (illus.), and several demonstration panels will be actually working. Electrically operated valves, type "PMV," are of wide utility for central heating installations and industrial processes. They are of the butterfly type, operated by a very simple form of a.c. pulling motor mounted on the valve casting and electrically connected to the controlling thermostat, driving through gearing on to a low-speed final drive which rotates at less than one r.p.m. with very high torque. This low-speed drive is coupled by a connecting link to a crank arm fixed to the butterfly spindle so that half a revolution of the low-speed drive will completely open the valve and the next half-revolution will completely close it.

Surface and immersion thermostats for boiler control have all-metal switch



The Scotoid tubular mirror light

mechanism, and the means of adjustment is particularly convenient and easily visible in poorly lighted boiler

houses. Type "P" is arranged for clamping, vertically or horizontally, on the riser pipe from the boiler. Thermal contact with the pipe is made by means of a metal cap, which protrudes through the base of the instrument and transmits the heat of the pipe to the sensitive element. The "WPS" thermostat is of the immersion type and is therefore more precise in operation and more sensitive than a surface instrument. It is intended for fixing directly into the boiler or into an elbow in the riser and is supplied as standard with a removable sheath over the stem.

George Salter & Co., Ltd.

This company specialises in the production of grey iron castings for the electrical trade, and there is a good display of specimens. Testing machines form another important part of the company's business, and many of these are used for tensile tests and tensioning wire and cable for overhead conductors.

Scotoid Co., Ltd.

These manufacturers of moulded products, brass and metal ware are showing such domestic illumination devices as sphere and tubular equipment, incorporating roof fittings, pendants, brackets, and table standards in various finishes. A tubular mirror light (illus.) and a sphere table standard are of modern design, and both incorporate a push-button switch. Another item is a new electrically heated waffle iron.

Francis Shaw & Co., Ltd.

These makers of machinery for the rubber and plastic moulding industries are showing a hand operated machine for moulding cellulose acetate, together with a small hand pump, various valves, and other fittings. The speed of "Franshaw" semi-automatic moulding presses is indicated by the fact that they are producing flat articles on which the ram falls a distance of 12 inches in 5 seconds and rises the full stroke in 4 seconds.

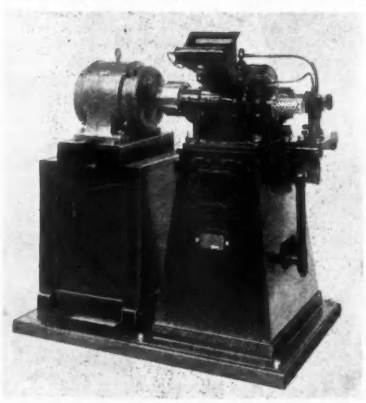
For moulding synthetic resin and cellulose acetate 150-ton presses can be supplied with constant-pressure draw-back rams, when required, and electrically heated platens with long guides which completely encircle the columns. The daylight can be varied within limits and the ram packings are easily renewable without dismantling the press.

Shropshire, Worcestershire, and Staffordshire Electric Power Co.

This stand is again in the nature of an information bureau concerning the joint service offered by the company and its associate, the South Wales Electric Power Co. The design of the stand is quite modern, the materials used for covering the structure being black velvet with chromium-plated metal strips and fittings. The extreme back is made up of cut-outs in attractive colours, which are illustrative of industrial activity. Well-printed and illustrated publicity matter will be available to provide complete information for industrialists contemplating extensions or the starting of new enterprises.

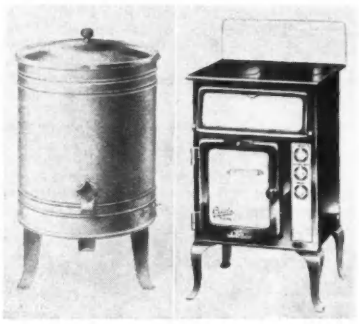
Siemens & General Electric Railway Signal Co., Ltd.

In the "Quarry to Road" Section this company has a set of four three-way traffic signals, complete with controller,



A speed increasing gear unit with illuminated sighting arrangement (Turbine Gears, Ltd.)

in operation. They are actuated by modern S.G.E. fixed time cycle control equipment, two of the signals being of the bracket type, while the other two are mounted in top-of-post fashion. The posts have heavy cast-iron inspection bases, but weldless drawn-steel posts are available; there is room in the base for housing a small meter, switch, and fuses. Adjustable faces enable the angles of the indications to be varied to suit the angles of the roads to which they apply. Because of the series switching system adopted the life of the contacts is increased, as well as that of the lamps, owing to the use of one-half of the lamps



A new "Creda" wash boiler and cooker

as buffer resistances for the other half on changing over the indications. There is also a saving in cable, as only five cores are required between signals, as against six with the systems of switching ordinarily used.

P.B. Sillimanite Company, Ltd.

Of primary interest this year will be a new fire constructed entirely of "Sillimanite," with the exception of the metallic resistance, and designed to get maximum efficiency in deflection of heat rays. These fires are claimed to be absolutely shock proof and are produced in a pleasing range of colours.

An electric furnace, and a gas-heated hot stamping furnace show further applications of "Sillimanite." Improved methods of pressing bricks can be seen, while cast blocks exemplify a distinct advance in manufacture. Refractory making is represented by a display of small articles, which can be turned out accurately to half a millimetre.

Henry Simon, Ltd., and Turbine Gears, Ltd.

This joint exhibit will include conveyor units, automatic weighers, fans, soap-making machinery, gear units, flexible couplings, speed-changing gears (illus.), &c. In the "Axien" coupling springs are arranged radially in groups, each consisting of a number of thin laminations so arranged that loading deflects them in their natural curve and the stress is distributed evenly throughout the whole length. As the load increases the free length of the spring is reduced, support being obtained from the inner projecting lugs upon the flange.

The "Simon" patent vertical garage for car parking in the big cities consists of a number of cradles or cages for individual cars, suspended close together from two endless chains, which pass over sprocket wheels at the top and bottom of the building so that there are two vertical lines of cradles side by side. When the sprocket wheels are rotated the cradles on one side ascend and those on the other side descend, hanging vertically. The parking machine is controlled electrically and the operation is extremely simple.

Simplex Electric Co., Ltd.

This exhibit will comprise an extensive range of electrical installation material sold under the name of "Simplex," and domestic appliances, such as cookers, fires, water heaters, &c., sold under the name of "Creda," in addition to a wide range of street and industrial lighting fittings, previously sold under the names of "Credalux" and "Simplex." There are several improved models of electric cookers, and a wash boiler (illustrated).

On the installation side there is a representative exhibit of conduits, fittings, screwing tackle, &c., an entirely new range of S.E.S. switchgear embodying improved designs and lower prices. An example of an S.E.S. control panel will be found on the stand in actual use.

Many new lighting fittings will be exhibited for the first time, and further examples of industrial and street lighting fittings will be found in the "Road and Quarry" exhibit outside the building proper.

Examples of the "Creda-Vulcan" tubular heaters are in the E.D.A. kiosk, main dining-room, public rooms, and in other parts of the Fair.

Skefko Ball Bearing Co., Ltd.

Comprehensive ranges of ball and roller bearings include single row ball bearings, double row self-aligning ball bearings, taper roller bearings, cylindrical roller bearings, and single and double thrust ball bearings. "SKF" power transmission equipment is represented, and photographs and actual sectioned examples of units show the applications of these bearings to axle-boxes, electric motors, conveyor idlers, worm reduction gears, pumps, vacuum cleaners, &c.

H. C. Slingsby

Trucks of all descriptions include a variety of electric tractors, battery-propelled industrial trucks, mobile cranes, and lifting-tiering trucks.

The automatic models are made to operate in narrow and confined spaces, to enter into wagons, lifts, etc. The controls are simple, and all vital parts of the different models are interchangeable. Transmission is by silent chain in the lighter models, and in the heavier types by worm drive. The motors fitted are ball-bearing throughout and permit of the fully loaded truck negotiating gradients of 1 in 10. Safety in operation has been specially considered.

Sturge & Baker, Ltd.

This season a modified form of the "Red Cross" fire is offered which is intended to be used as a movable inset (illus.), filling the fireplace opening and fitting flush against the surrounding tiles or glazed brickwork. It

The Sturge & Baker "Red Cross" 1½-kW inset fire

can be used independently by opening out a support at the back of the frame to enable it to stand up. When wanted as a permanent inset, a switch is fitted in place of the support without extra cost. This fire is made in three sizes (1, 1.5, and 2.5 kW), and the element and reflector are of unusual design, the latter being made of chromium-plated copper; the finish of the surround can be altered to suit requirements.

A new pattern of flex winder, which is designed to minimise damage to hand-lamp flexible connectors, is now being offered at 30s., including a strong inspection lamp and 15 ft. of c.t.s. flexible cable; it should be very useful in private garages.

The latest pattern of bed-warmer is designed to fill the whole of the bed with hot air. A new form of flex-absorber is being offered for fitting into the base of floor standards and table lamps for winding up loose flex.

Sunbeam Vacuum Cleaner Co., Ltd.

In addition to electric vacuum cleaners which are marketed under the names of "Sunbeam," "Tempest," "Electro-Vac," and "Triumph," a novelty will be a "Mammoth" cleaner which is specially constructed for use where large surfaces are to be cleaned, as in hotels, theatres,

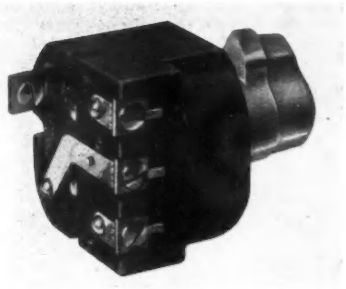
stores, banks, hospitals, etc. This company is now also manufacturing a moderately priced electric hair-dryer, electrically heated blankets and warming bottles with specially constructed temperature regulators.

S. & W. (Lighting), Ltd.

Main interest in this display of illuminating and decorative glassware centres on the variety of effects and numerous new patterns obtainable by the use of "Flakestone," quite apart from examples of three-ply glasswork. Some of the cut-glass table lamp standards are very beautiful, and the differently coloured veining introduced into single lamp-shades and pendant globes is most pleasing in effect. Many and varied shapes and designs are available, including wall brackets of "shell."

Taylor & Challen, Ltd.

One of a collection of power presses (illus.) is for the automatic notching of armature discs with an attachment for punching half-round notches, the speed ranging from 350 to 700 notches per minute. The gear for transmitting the motion from the horizontal crankshaft to the vertical spindle, which intermittently turns, is of simple and light design, the motion to the vertical spindle being obtained by a friction band.



The Tok "Kubic" cooker switch

A motor-driven press, which exerts a pressure of 100 tons at the bottom of the stroke, has a built-up frame held together by four tie-rods shrunk in position. All gears are machine cut; a top extractor is provided, and a bottom one also if desired. The crankshaft has a patent clutch, operated by foot-lever, and the back-shaft has Timken roller bearings.

Herbert Terry & Sons, Ltd.

An assortment of springs, presswork, and ironmongery will include such tools as wire cutters, spanners, screwdrivers, etc.

John Thompson, Ltd.

On an outside stand are a self-contained 200-lb. boiler for hotels, laundries, &c., where space is limited; a sectional superheater; a 120-lb. vertical multi-tubular boiler; and a section of an electrically welded high-pressure water tube boiler drum 2 in. thick.

Tok Switches, Ltd.

This range of all-British heavy duty, rotary snap switches for the control of electrical cooking and heating apparatus have special fireproof covers which make them absolutely safe under all conditions.

The latest product is the "Kubic" switch (illus.), which has been developed in order to meet the requirements of British modern cooker manufacturers. It is arranged for one-hole fixing, for mounting immediately behind the front plate of a cooker, and the switch itself is of the reciprocating pattern, giving three-heat control. The base is about 2½ in. square, of dark material and well finished throughout, with clearly marked terminals that are easily accessible. The switch, which is rated at 10 A, 250 V, and costs 6s. 6d., can be mounted in any position to suit the cooker manufacturer, and extension rods are also supplied, so that the switch may be mounted at the back of the cooker and the operating knob on the front.

"Tok" rotary switches are available in a wide range of standard types, but the manufacturers also cater for any special requirements. Other patterns with "Bakelite" covers, single and double pole, are the reciprocating with porcelain pointer key and the non-reciprocating with porcelain indicator and reversible key, including the 600-V "Barrier" type which is also made two-way non-indicating.

Tube Products, Ltd.

The utility and wide application of light gauge welded steel tubing will be demonstrated, the stand itself being an interesting example; it is made mainly of tube, ranging in sizes from ½ in. to 2½ in. in a number of finishes. There is a wide variety of sections and finishes with many products made from plain and manipulated tube, including transformer tubes and tubular steel furniture.

J. H. Tucker & Co., Ltd.

To the "Spartan" shockproof range has been added a 15-A switch and 5- and 15-A combined switch sockets (illus.) of a neat appearance, the socket portion being set at an angle which allows either handshield or ordinary type 2-pin B.S. gauge plug to be used, at the same time reducing overall projection to a minimum. Socket tubes are of "one-piece" construction fully shrouded in porcelain, and situated at the side of the switch for ready and convenient access.

An insulated ceiling rose is now available in both two- and three-plate patterns. The interior, carrying the conducting metal parts, is made of English vitreous porcelain, and the cover is of moulded "Telacite." In addition to the above-mentioned interior, the cover will accommodate either a two- or three-way connector, or, alternatively, two or three thimble type screw-on connectors. The batten type insulated lampholder body is moulded all in one piece, the only detachable part being the shade ring or Home Office skirt. The terminals are of the hollow plunger type.

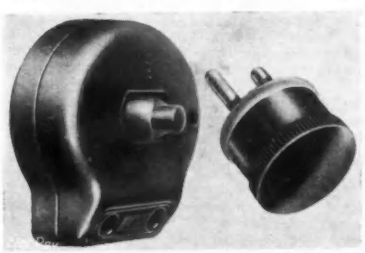
An entirely new design of cooker control unit has a main q.m. and b. switch of 30 A, with provision for enclosed "Pigmy" pilot lamp. The subsidiary circuit of 5 A consists of a d.p. tumbler switch and a 2- or 3-pin socket. Particular attention has been given to the design of the case, lid, and external operating handle with a view to producing as compact an arrangement as possible, and instead of employing the usual type of lever-operating handle for the main cooker switch, a rotary type of handle has been devised which considerably reduces the overall projection.

A new range of fuseboards with a rating of 5 A at 250 V is now available in 2, 3, 4, 5 and 6 ways. The fuse units are of the H.O. shielded type, the contacts being of the circular plug and socket type. It is only necessary when re-wiring to unscrew the contact pins slightly and insert the ends of the fuse-wire beneath a clamping plate; no screws are employed, and an earth terminal is provided.

A new 2-way 15 A 250-V d.p. switch-fuse splitter has a double-pole q.m. and b. switch that is actuated by pushing a horizontal driving spindle with a handle or knob on each end located on the left and right sides respectively. The lid of the case is interlocked to prevent access to the interior with the switch "on," or, alternatively, to switch "on" with the lid open.

Tudor Accumulator Co., Ltd.

Various types of accumulators in glass and lead-lined wood containers, as used for country house lighting, works lighting, telephone operation, and similar services are to be seen, and there is an example of the type of cell supplied for use in central stations, having a capacity of 16,000 Ah at the 10-hour rate of discharge, and a representative part of one of the "Tudor" batteries used for the propulsion of electric vehicles, together with sectional cells showing the construction. Batteries for bus-lighting and marine purposes are also shown.



The Tucker "Spartan" combined switch socket

The "Tudor Safetylyte" system of secondary lighting will be demonstrated by a complete cinema type of emergency lighting equipment, with a capacity of 1,500 W for a period of one hour, shown in operation, as well as equipment used in hospital operating theatres.

Vac-Tric, Ltd.

The new "Vac-Tric Popular" vacuum cleaner, listed at £6 12s. 6d., was described in detail in our last issue (p. 197). It is a cylindrical model built on lines similar to the well-known "De Luxe" machine, but a little smaller.

The "De Luxe" model is priced at £12 12s., and incorporates a ¼-h.p. motor, 10,000 r.p.m., and a double-stage fan which produces a 36 to 40-in. water lift. The body is covered in grey crocodile-patterned cloth, and the domed ends and fittings are nickel-plated. It runs on rubber-tyred wheels. The "H" vacuum is of the exterior-bag type, and sells at £9 19s. 6d.; all parts are completely insulated.

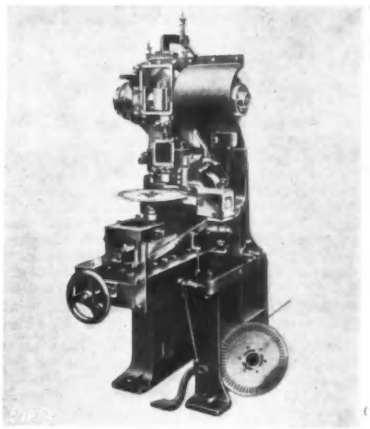
The "Vac-Tric" refrigerator has a food-storage capacity of 5 cu. ft., and the interior is finished in vitreous porcelain. The exterior finish is white cellulose enamel, and the price is 34 gns.

Vacuum Lamp Co., Ltd.

The incandescent electric lamps made by this company include the gasfilled type which is known by the name of "Luxram." This lamp is obtainable in all the usual types and wattages for general use.

Walker Fender Co., Ltd.

This company has three electric lighting novelties in the form of table lamps with decorative art shades. One type has a neat calendar incorporated in the metal base, while the two others have an ash tray attached in such a way as to swivel round to any position. These attractive lamps are made in all finishes, including chromium plate, oxidised-silver, antique brass, copper or bronze.



Taylor & Challen high-speed notching press

Walsall Conduits, Ltd.

The main feature of this stand will be a counter round its three sides on which the various products are grouped as follows:—Sherardised saddles, pipe clips, flexible adaptors, etc.; flameproof gear, multiple switch units, switch plugs, interlocking switch-plugs, bulkhead and grip continuity fittings in various sizes; ironclad switchgear, fuse-boards, cut-outs, and the "Wal-kall" metal-sheathed wiring system in silver grey finish.

In the watertight section are switch and socket plugs, junction boxes, multiple switch boxes, and there is a new "Waloid" waterproof and corrosion-resisting finish. Ranged in position at the back of the counters are examples of Walsall conduit, grouped in the various finishes that are now regularly supplied.

H. W. Ward & Co., Ltd.

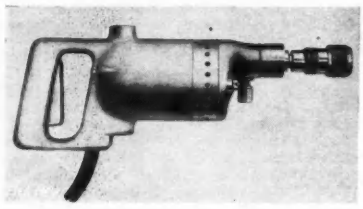
These machine-tool makers will be displaying a selection of standard tools, toolholders, and accessories suitable for all makes of capstan and turret lathes. In addition special attention is being directed to a new air-operated chuck, in-

cluding models suitable for dealing with bar work. "Tudor" concentric chucks will also be on view.

Ward & Goldstone, Ltd.

The principal products on view will be a full range of insulated cables, flexible cords, and conductors, with "Bakelite" wiring accessories for automobile, radio, and electric lighting purposes. The features of "Ivorant" moulded components, which are specially suitable for use in hospitals, nurseries, bathrooms, etc., are their attractive appearance, durability, and the ivory colour and finish.

"Goltone" adaptors are made of brown and walnut "Bakelite" in parallel, series, bi-pole two-light, and two-pin cord grip extension types, while a two-



A Wolf electric hand drill

way parallel model in which a switch is incorporated enables a small domestic appliance to be tapped off a lighting point. Another type permits a bayonet cap to be adapted to fit 2-pin plug sockets.

The "Aristol" pear switch has a cord grip, china interior, and one- and two-way quick-break action; the "Pigmy" is of the quick-make-and-break pattern and is fitted with three terminals to enable it to serve as a one- or two-way shockproof switch.

All these devices are moulded products, as is also the "Busy-Bee" buzzer whose dimensions are 3¼ by 2⅜ by 1⅛ in. only.

Westinghouse Brake & Saxby Signal Co., Ltd.

A very comprehensive range of metal rectifier sets for battery charging and industrial use includes multi-circuit and single-circuit types for every purpose where d.c. is required from a.c. supplies.

Besides all the popular standard models, three new commercial sets are exhibited for the first time. The "H.T.C.1" (illus.), for charging h.t. wireless batteries, has four independent circuits, each with a maximum output for charging a 60-V battery at ½ A, or a 120-V battery at 0.125 A or 0.25 A; this is sold at £23. The "R.G.C.7" is a two-circuit set. One circuit for charging 1 to 50 cells at up to ½ A (or one 120-V h.t. battery at ¼ A), the other circuit for 1 to 25 cells at up to 2 A; this is a good general purpose charger for a small station, and costs £22. The "R.G.C.8," for car starter batteries, will charge from one 6- to six 12-V batteries at 6 A; the price is £27 10s.

In addition to the commercial sets there is being exhibited for the first time the new "Westric" car battery trickle charger for use on private house mains; its retail price is only 75s. It is silent and incorporates a transformer for regulating the output to suit different makes of car batteries. A socket is fitted to the dashboard of the car so that the charger may be plugged in while the car stands in the garage during the night, and the battery is fully charged by the morning.

Wild-Barfield Electric Furnaces, Ltd.

Box-type furnaces for carburising, reheating, hardening, annealing, &c., are suitable for temperatures up to 1,100 deg. C., and it is interesting to note that a furnace of the same type has been operating entirely satisfactorily for many months at temperatures between 1,200 and 1,300 deg. C. The long immunity from breakdowns is due to the "heavy-hairpin" elements which are fitted. They are adequately supported, yet free to radiate into the chamber; are made of "Pyromic" nickel chromium, and when replacement is necessary each individual hairpin can be removed by the user whilst the furnace is hot.

A furnace with forced air circulation will be seen in operation. The patent centrifugal fan is incorporated in the bottom of the chamber, obviating trailing cables and rendering the fan immune from distortion due to constant contact with cold air when the door is opened. The equipment is complete with a Wild-Barfield-Foster charge progress recorder and automatic temperature control.

"Telcon" electric resistance materials include "Pyromic" 80/20 nickel-chromium alloy from which the elements for Wild-Barfield furnaces are made; "Calomic," a ternary alloy containing nickel, iron, and chrome in the proportions 65:20:15; and "Telconstan," a copper nickel alloy, which has a negligible temperature coefficient of resistance. These alloys, made by the Telegraph Construction & Maintenance Co., Ltd., are distributed by Wild-Barfield Electric Furnaces, Ltd., while G.W.B. Electric Furnaces, Ltd., provide samples of "Eternite" and "Kleenard," the two case-hardening compounds for box and open hearth work, respectively.

Wilkins & Wright, Ltd.

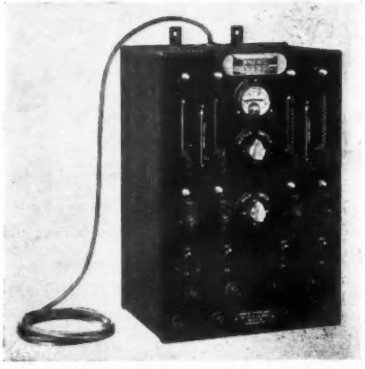
This selection of machine- and hand-made electrolier chains, over 400 in number, is one of the largest displays of its kind. Electric lighting accessories include ceiling plates, galleries, bowl sets and fittings, canopies, fancy chains, switch plates and "Bakelite" accessories, There are also shop-window reflectors, many kinds of stampings in which the company specialises, and samples of general brass foundry work.

Edward Williams

This firm will exhibit a comprehensive range of ball bearings, from the smallest, to fit shafts ¼ in. in dia., up to the largest, to fit shafts 1 in. in dia. Representative specimens of chain wheel and crank sets for the motor and engineering industries are also included.

S. Wolf & Co., Ltd.

In an extensive range of British-made portable tools will be hand drills of ¼, ⅜, and ½ in. capacity (illus.), a portable ⅜-in. drill, and hand, bench, and pedestal grinders, all of which are electrically driven. The machine frames and gear boxes are special alloy die castings of light weight and "unbreakable." Wherever possible the insulation is moulded "Bakelite" and the windings are var-



The Westinghouse "H.T.C.1" battery charger

nished, all being non-hygroscopic for safety in damp situations. Both plain and ball bearings are incorporated, while fan and baffle ventilation of the windings enables these tools to work for long periods at a time.

Exhibitors in London

A.B.E.C., Ltd.

This company manufactures escapements for clocks, instruments, and industrial purposes, as well as the wheels and pinions used by Smith's English Clocks, Ltd.

In clock manufacture on mass-production lines, block pressing of the frame plates comes first; then the piercing with dies in one operation. That is to say, all the holes for pivots, pillars, screws, and locating pins are punched out by one blow. Generally, also, all screw holes

A "Hanovia" analytic lamp

can be tapped at once by another operation. Wheel blanks are made by pressing, but teeth must be formed by cutting.

Aladdin Industries, Ltd.

Table standards made of untarnishable metal are portable and incorporate three lamps with shades of different shapes and patterns. Their originality lies in their tubular design.

Arcon Engineering Co., Ltd.

These makers of ozone generators, transformers for neon lighting and other special purposes, switches, coil testers, valve-operated aids for deaf people, pipe and cable locators, etc., have produced a device for use in place of an aerial for radio reception. It is known as the "Ackentic" aerial, and is made up in the form of a small cylinder which is buried under the earth.

Automatic Coil Winder & Electrical Equipment Co., Ltd.

"Douglas" automatic machines, either hand driven or power operated, are well known for winding coils for electrical and wireless purposes at speeds up to 5,000 revolutions per minute. There is an ingenious attachment for winding paper insertions in the coils and also an insert attachment for interweaving cotton thread with the wire while the coil is being wound.

The d.c. "Avometer" combination measuring instrument actually combines the advantages of thirteen different instruments in one, as it provides for taking thirteen different ranges of *direct* readings in ampères, volts, and ohms without the use of external shunts or multipliers, or the need for calculations of any kind. The recently introduced universal set combines all the advantages of the d.c. meter with three ranges of readings in current and four ranges of readings in voltages for use on a.c. (50 cycles).

The "Avodapter" does away with all the difficulties of testing valves and valve circuits inside a radio set. Such tests can now be made on the bench externally, as the valve under test is placed in the base of the "Avodapter" and a patent convertible 4- or 5-pin plug is fitted into the valve holder in the set. For those who already have suitable testing equipment this convertible plug can be supplied as a separate unit.

Beetle Products Co., Ltd.

This company manufactures a wide range of "Beatl" moulding powders, suitable for many electrical uses. These powders are available in white and "live" colours, and the company claims that it is the only English concern which produces such raw material in white. A feature is a new and improved form of "Beatl" industrial powder of greater density. Laminated sheet is made from "Beatl" synthetic resin, and this material is incorporated in the construction of the stand.

Belling & Lee, Ltd.

These exhibits comprise various forms of radio connectors—terminals, wander-plugs, plugs and sockets, terminal mounts, fuses and fuseholders.

New lines which will be shown for the first time comprise the "Unit" pick-up, adjustable and fixed arm length, volume

control, fused input connector, and fused output connector, which are particularly suitable for use with relay services. A number of lines have been introduced in walnut "Bakelite" where previously they have only been available in black. For instance, the terminal mounts, "R" and "B" type terminals, and single baseboard fuseholders are now all available in walnut.

British Blue Spot Co., Ltd.

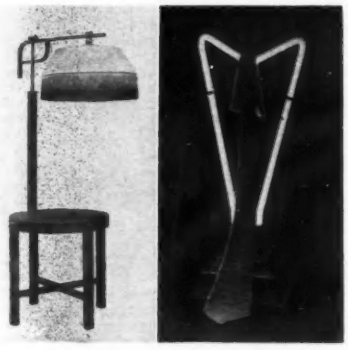
Two new radio receivers are the K.252 table (illus.) and R.336 pedestal models, both of which are built into walnut cabinets and are battery operated. Both are of the same circuit and chassis design, using two variable-mu screen-grid h.f. valves, a detector, and power valve. The larger set has a pentode with output filter and p.m. moving-coil speaker. Smooth volume control is fitted, and a patent reaction arrangement that avoids the need for retuning when reaction is varied. Provision is made for inserting a gramophone pick-up and for initial aerial compensation.

There are several models of "Blue Spot" loud speakers; the permanent magnet 75PM moving coil type reproduces all frequencies between 50 and 5,000 cycles, and is capable of taking outputs of from 200 mW to 3.5 W. The 99PM chassis is an example of good workmanship. The forged cobalt steel magnet is powerful; the pole pieces are cadmium plated to prevent rusting; and side plates protect the gap against the influx of dirt, &c. The maximum undistorted output is 3.5 W and the maximum d.c. current 50 mA.

British Hanovia Quartz Lamp Co., Ltd.

This company claims to manufacture lamps for every known application of ultra-violet rays. All models for popular, scientific, and medical uses incorporate mercury-arc burners in quartz containers. The "Homesun" lamp for indoor sun baths is a familiar appliance.

A striking display of fluorescence is being arranged. Above a representative display of specimens (minerals, oils, etc.) powerful quartz lamps with filters will be run continuously and produce brilliant fluorescence in the specimens, which is, however, masked by ordinary lighting bulbs operated by a switch, to show the contrast between the fluorescent and natural appearances of the objects shown.



A combined table and standard (British National Electrics, Ltd.) and a neon display stand (Franco-British Signs)

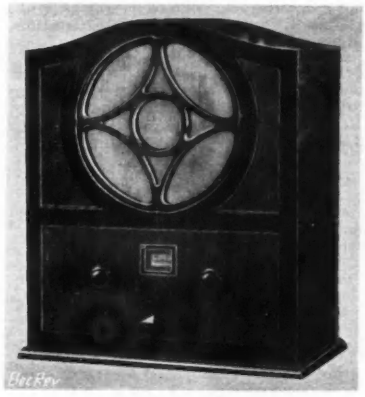
Representative models of equipment for medical and hospital use include the "Duo-therapy" unit, which combines an actinic source with a luminous heat lamp for general medical use. The Kromayer lamp, model II, is for applying actinic rays to local areas and in cavities, while there is an analytic lamp (illus.) for laboratory use in fluorescence tests.

British National Electrics, Ltd.

This company's display will consist entirely of a range of "Angus" floor lighting standards and table lamps, some of the most interesting items being combined tables and standard lamps (illus.), which incorporate rise and fall and swinging motions. They are supplied in oak, mahogany, and walnut finishes. The company also has an exhibit at Birmingham.

Brownie Wireless Co. (of Great Britain), Ltd.

Apart from its radio activities, this company is a manufacturer of high-class mouldings in "Bakelite," synthetic resins, and fireproof and plastic materials for the electrical, radio, fancy goods, surgical, motor car, and several other trades. Items of particular interest displayed are lighting pendants, meter cases, vacuum cleaner housings, and an interesting completely built-up neon sign. The mouldings are produced in a variety of attractive colours.



A "Blue Spot" radio set

Candy & Co., Ltd.

In this display of decorative "Wescontree" ware are a few modern designs of electric pottery lamp standards, which fill the dual purpose of illumination and relief in the decorative scheme of a room. One of the company's "Devon" fires will also be on view at Olympia.

E. K. Cole, Ltd.

An entirely new all-wave receiver known as Model 37 (illus.) designed specially for overseas use, makes four or five distinct wave ranges available, from 16 to 550 or 2,000 metres, and these can be selected by a single switch without the necessity of changing coils. The circuit employed is a seven-valve superheterodyne and the set is marketed in chassis form only, in order that it may be housed in cabinets to suit individual requirements. Specimen cabinets can be supplied if required. All chassis components are constructed and all insulation treated to withstand extreme variations of temperature and other conditions.

"Ekco" three-valve chassis and five-valve superheterodyne chassis in attractive consolette, console, and radiogram cabinets, are designed for mains operation. The "Consolette" models are housed in attractive "Bakelite" cabinets manufactured in a recently installed plant. The company's power supply units are claimed to give smooth outputs with reliability and economy of upkeep.

Dubilier Condenser Co. (1925), Ltd.

Mica insulated condensers in moulded "Bakelite" cases are made in standard capacities of 0.00005 to 0.01 mF with a capacity tolerance of ±15 per cent., tested to 500 V a.c., and suitable for working at 250 V d.c.; but they can be supplied for higher working voltages and with closer tolerance if required. A high-grade cylindrical pattern has a paper dielectric and is enclosed in a paxolin tube, which is fitted with brass end-caps to which are fixed suitable connecting wires. Sizes up to 0.002 mF are tested at 1,500 V d.c., and other capacities at 750 V d.c.

Mouldings by Insulators, Ltd.

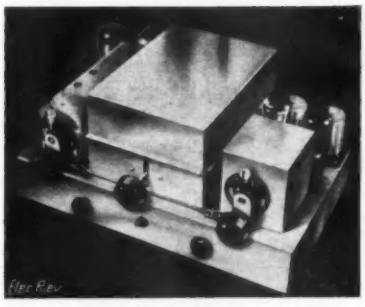
Dry electrolytic condensers in rectangular cardboard containers are suitable for operation at 450 to 500 V and available in capacities of 4 and 8 mF. A low-voltage type in nineteen capacities from 2 to 2,000 mF is made for working at 12, 25, 40, 50, 100, and 200 V. They are supplied in paxolin tubes, rectangular boxes, and the standard vertical cylindrical aluminium container.

In addition an extensive range of paper-insulated condensers is specially designed for manufacturers and general commercial use, besides high-voltage smoothing and transmitting types and condensers for power factor correction purposes. The company's products are generally suitable for use in tropical climates, and special designs to meet overseas requirements can be produced.

A range of metallised resistances, in 0.5, 1, 1.5, 2, and 3-W sizes, is coloured according to standard R.M.A. practice. Other products comprise mercury switches, relays, resistances, and voltage regulators for industrial applications.

Ebonestos Insulators, Ltd.

Here is a comprehensive collection of articles made of moulded "Ebonestos" compositions and synthetic resins.



An "Ekco" 16-2,000 metres receiver

Among them are a considerable number of mouldings used in various sections of the electrical industry. The company undertakes all kinds of work for the trade and has produced well finished parts and components for manufacturers and Government Departments, many of them being very intricate in design.

Ever-Ready Co. (Great Britain), Ltd.

Lead-acid accumulators for radio purposes are made up in glass and celluloid cases, the latter including two unspillable types for portable receivers, one containing free acid and the other jellied electrolyte. There are also two patterns cased in ebonite, one for general purposes and the other for motor-car starting and lighting.

High-voltage dry anode batteries are made in standard units. Dry cells for such general purposes as bells and telephones are made in a variety of sizes and for all types of portable lamps.

Fescol, Ltd.

This collection of moulded articles will illustrate the use of moulds that are protected against corrosion by a coating of chromium deposited electro-chemically by the "Fescol" process, which is also adaptable to the building-up of worn parts and the decoration of metals. Interlocking between the base and applied metals, which intensifies adhesion and cohesion, distinguishes the method from ordinary plating.

The process enables very heavy deposits to be put on, and permits the deposited part to be subjected to torsion, shear, and friction without disturbance. Further, the process being a cold one, it does not distort the part under treatment. The metals most commonly employed are nickel, suitable for most initial protection against corrosion and for restorative work; this material also stands up well to torsion and abrasion. Chromium is used as a bearing material and in conjunction with nickel for decorative purposes. Cadmium is employed as a corrosion resistant and lead for protection against the action of sulphuric acid. Copper is called for in certain cases, but is rapidly being replaced.

Franco-British Electrical Co., Ltd.

This company claims to be able to supply every need in sign requirements, for its exhibits include so varied a range as neon, electric, and non-illuminated signs of all types for advertising, road signs, warning and traffic signals. One of two novelties is known as the Franco "Edgelite" sign and provides a neon display at a very low price. At the same time it is economical in current consumption. This sign, which comprises plate glass panels on which is etched the message and which are diffusely flooded through their edges by neon tubes, offers scope for illustration and announcement for the window or for the inside of a retail shop and is also a highly effective form of interior direction notice. This sign can be obtained as a suspension or pedestal type ready to connect to any a.c. point.

The second development is a range of display stands (illus.) in which the neon tubing, rising out of the pedestal base, provides a stand for the display of goods. Soft goods, such as ties, &c., can be draped round the curves of the illuminated tubes, and further facilities may be added in the form of clips. Special stout gauge tubes are used to overcome the fragility of the earlier type neon tube and the whole comprises a self-contained unit ready to plug into any a.c. point.

Fraser & Glass, Ltd.

It is the policy of these plastic moulding engineers, who include cellulose acetate in their processes as well as "Bakelite," to specialise as suppliers of the minimum number of standard lines made with stock moulds. The electrical and wireless trades and manufacturing chemists are catered for more particularly, but

Geo. Nobbs fresh-water distiller

metal piercing and stamping are also undertaken. Moulded bobbins are a standard product, from the smallest, such as are used for telephones, to the largest transformer and choke bobbins for all-mains radio instruments. Other standard lines are transformer and meter cases and knobs of all kinds. Mouldings are also made to customers' own specifications.

General Electric Co., Ltd.

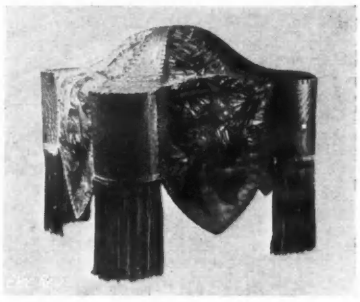
This exhibit is confined almost entirely to radio equipment. Five receivers reveal careful design allied with precision in construction, and overseas visitors will be particularly interested in two superheterodyne receivers designed for short and medium wavelengths. One is for a.c. mains operation and is in table form in a handsome teak cabinet. The "All-Wave" superheterodyne receiver for battery operation (13 to 720 metres) is constructed to a stringent tropical specification, with a metal case finished in brown crystalline enamel.

A third set, which is built up on superheterodyne principles, primarily designed for the home market, is a table instrument for use on a.c. mains and covers medium and long broadcast wavelengths with one-knob tuning. An electromagnetic moving coil speaker is incorporated.

Radio relay equipment specially designed for installation in hospitals and similar institutions is made the subject of a separate display, in addition to an imposing array of "Osram" valves for a.c., d.c., and battery operation, and a specimen of a 500-kW externally cooled transmitting valve of the kind used by the General Post Office for transatlantic telephony at the Empire wireless station, Rugby.

S. Guiterman & Co., Ltd.

Mains-driven "Igo" frequency-controlled a.c. clocks have a current con-



A Mayfair pendant shade

sumption not exceeding 9 mA. The different designs of various colours are all of neat appearance; a silently-running seconds hand is provided.

Ordinary and alarm models are obtainable, and drawing pins which match in colour are supplied for neatly and safely fixing the special double connecting flex provided with the clocks. The motor speed is 200 r.p.m., and all the gears are machine cut, not pressed.

F. C. Heayberd & Co.

This display of mains components for radio use will include "stripped" transformers for set manufacturers as well as standard models encased between metal end plates. Mains units for a.c. use, Westinghouse metal rectifiers (full wave) with ample smoothing circuits, and fuses are inserted in the larger models, most of them also having an alternative output switch which increases their adaptability. D.c. units are so designed that they can be converted for a.c. without trouble, while several kits of parts for home assembly are marketed. Outfits for charging filament accumulators at home are available, besides such accessories as low-frequency inter-valve transformers, chokes, condensers, wire-wound variable resistances, and measuring instruments.

Insulators, Ltd.

These manufacturers of moulded "Bakelite" and mica and micanite stampings are showing many specimens of their work (illus.) which will interest the electrical industry. Parts of switch and fuse-gear, of insulated wiring systems, etc., are some of the "Bakelite" mouldings made for electrical purposes, the daily output of which alone is said to be about 40,000 parts.

J. B. Electrical Co., Ltd.

This firm is the wholesale distributor of "Barlux" low-voltage luminous tubes which are made by Low Tension Luminous Tubes, Ltd. They are obtainable in various lengths and colours, straight, curved, etc., for operation direct off ordinary a.c. or d.c. mains without needing transformers. The diameter of the tube is 25 mm. and the loading 35 W per ft. "Barlux" tubes radiate light evenly throughout their entire length, and thus greater distribution of light is obtained.

The tubes are easily installed and costly fittings are unnecessary. The life of the tubes is guaranteed to be at least 1,000 hours, and the temperature attained is so low that the tubes can be fixed quite close to wood without risk of fire.

K.F.M. Engineering Co., Ltd.

The category sign, which is specially designed for cinema use, is illuminated on the same principle as the "Internalite" sign, that is through the edge of the plate-glass sheet, but adhesive letters are fixed to the face of the sign and can be changed at will. There are signs for clipping on to the front of glass shelves and illuminating both the lettering on the front of the sign and the goods displayed below; also window reflector signs, house signs, interchangeable stencil and "Changeletta" signs, as well as electric clocks constructed and illuminated on the "Internalite" principle.

Tubular lamp-holders and reflectors are made of both the wide and narrow light types. Insulated rods are used instead of flexible connectors between the ends of the lamps, which are so housed as to prevent vibration of the plunger contacts.

Lacrinoid, Ltd.

These non-metallic fittings shown in the Plastics Section include a double-switch light and heat adaptor which is a "Bakelite" moulding with good mechanical parts. A complete series of switches which is being produced under the trade name of "Lacrinite" comprises surface, semi-recessed, and flush patterns as well as 5-A two- and three-pin switch plugs. They will be available either with white or brown "Bakelite" covers and dollies or with metal covers and dollies, executed in various styles. Two-way adaptors, combined junction boxes, and ceiling roses, and one- and two-way switch plates are also made of moulded brown and white "Bakelite."

Mannwares Co.

A table model radio set (illus.) is made for a.c. or d.c. mains operation, incorporating three valves, single dial band-pass tuning. An m.c. speaker is provided and gramophone pick-up. The radio-gramophones are table models for a.c. or d.c. mains drive, the record turntable being driven by an electric motor. The receiver portion and speaker are similar to the above set.

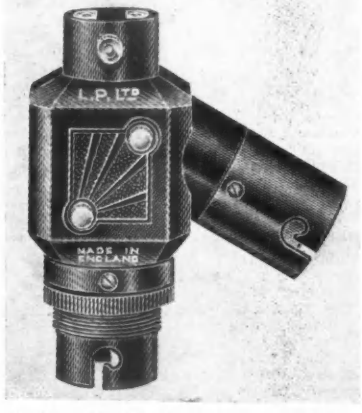
"Mavox" All-Electric Radio

A new model receiver for overseas use (15 to 80 metres) is a superheterodyne set utilising three screen-grid valves and two pentodes with quiescent push-pull output consuming about 12 mA. It is battery operated and uses a "Celestion" moving-coil speaker. Another battery set is a superheterodyne for all waves (15/80-200/550-1,000/2,000 metres) which incorporates three screen-grid valves, a triode, and two pentodes in quiescent push-pull to feed an m.c. speaker.

For a.c. mains operation there is a six-valve all-wave superheterodyne with m.c. speaker which has band-pass tuning for medium and long waves. All models are supplied in all-metal chassis form, complete with speaker, or in teak cabinets for export. These sets are sturdily made, both a.c. and d.c. mains-driven models being available. The tuning dial is calibrated in wavelengths, both long and short, and it is illuminated in two colours to avoid any confusion between long and short waves. Gramophone pick-up sockets are provided, and a "mains aerial" can be included.

Mayfair Shades, Ltd.

This company specialises in electric lamp shades which it manufactures in all the newest synthetic materials and parchment. Most of the shades displayed are on view for the first time and, in addition to conventional designs and shapes, there are exhibited a selection of modernist and futurist models. Bedlights are made of moiré or a combination of moiré and "rhodaline" in various colours with hand-painted decoration and hand-made silk tassels to match. Floor standard and pendant shades (illustrated) are also made of



A "Lacrinoid" double-switch adaptor

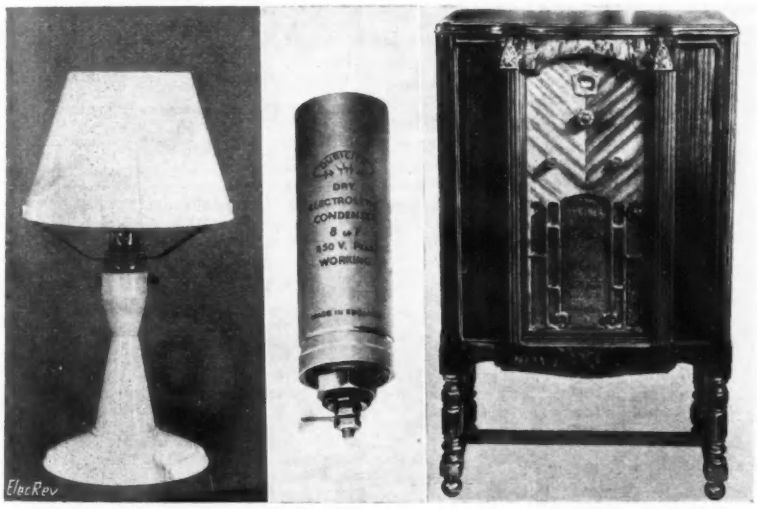
moiré and a new specially prepared material known as "frostaluc" with hand-painted designs. A selection of new chromium fittings and table standards is being displayed.

Geo. Nobbs, Ltd.

Automatic temperature controllers for electricity, gas, oil and steam, that may be employed for operating up to 1,000 deg. C., are represented by samples of instruments for application to furnaces, ovens, boilers, printing plates, incubators, etc. There are electrical types for use up to 500 V a.c. and d.c. and in conjunction with a contactor switch for capacities up to 100 A, two or three pole, adjustable over a given range with a sensitivity of 0.5 deg. F. according to requirements.

The all-metal types of controller now incorporate snap and break magnetic action, giving positive operation. Automatic electric hot plates are available for the production of medicinal capsules, vacuum embedding, etc., while the "Genii" system of warming by means of electric panel, wall, or floor types of hot-water radiators, which function at low temperatures, has the advantages of cleanliness and convenience.

The latest types of water heater and the geyser, or instantaneous class, are the "N.S.A." rectangular pattern for local storage at one point, and the "N.S.C." circular type for semi-pressure working and suitable for two or more points, with and without automatic temperature control. There is a range of immersion heaters for water and also for scientific and industrial applications, as well as for circulating water heaters for automobile engines. Besides such appliances as electric urns for making tea, coffee, etc., "Genii" fresh water distillers (illus.) are obtainable in sizes of from 0.5 to 4 gallons per hour. Model "T" is fitted with automatic boiler feeding device and has been specially evolved for conveyance on lorries and for use where only a small amount of water is available.



A Streetley all-moulded standard, a Dubilier dry electrolytic condenser, and a Philco five-valve superhet. radio set

Ozonair, Ltd.

This company will show a complete model plant for installation in theatres, cinemas, public buildings, offices, etc., consisting of an air filter and washer, cased centrifugal fan, electric motor, and ozone plant, capable of dealing with about 60 cu. ft. of cleaned and purified air per minute, in continuous operation. A combined heating and ventilating unit, especially designed for operation in factories, warehouses, etc., is also being shown in operation. Each unit is capable of dealing with about 600 sq. ft. of floor space, and in buildings where it is installed the use of long runs of heating pipes or numbers of radiators is entirely obviated. In addition, good ventilation is effected, with a marked economy in initial and running costs.

The type 68 "Ozonair" apparatus is for use in connection with ventilating schemes of large volumes, and portable apparatus for purifying the air in offices, stores, living rooms, etc., and for medical, chemical, and research work are other exhibits, as well as the "Ventex" air filter in its various standard sizes to suit every purpose and circumstance, with a sectional model of the self-cleaning type.

Partridge, Wilson & Co.

Apart from working examples of a comprehensive range of commercial accumulator charging plant, a new advertising sign of attractive design, which shows the words "Batteries Charged Here" by day and night, is being offered to the trade at 58s. 6d. net. Another new line is the "Davenset" automatic electric vehicle battery charging plant (illustrated), the control equipment for which is housed in a compact steel cubicle which totally encloses the transformer and glass-bulb hot-cathode rectifying unit. Should the main rectifier break down, another is automatically switched into circuit, and the fact is indicated on the panel.

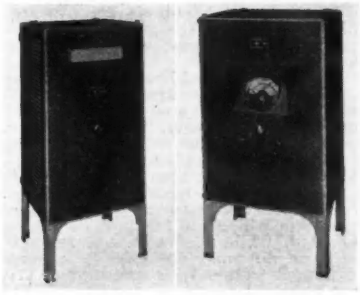
In the optical section is a working example of a three-phase static rectifier for supplying d.c. to cinema arcs (illustrated). It is made in sizes with outputs ranging from 80/110 V 25 A to 80/110 V 120 A.

Peerless Electrical Mfg. Co., Ltd.

Here will be a display of food preparation machinery. The "Baby" cake mixer has automatic lubrication, a ball-bearing motor, and push-button switch. In the sausage machine the cutting and mixing are synchronised to catch the meat juices before they congeal, and safety devices protect both operator and machine.

There is a new 0.25-h.p. coffee mill which will grind 12 different grades at the rate of 1 lb. per minute. The mincer has a 1-h.p. enclosed fan-ventilated motor and a switch in the base. Three sizes of machine (14, 22 and 56 lb.) are obtainable for automatically washing and peeling potatoes in one operation at an average speed of one minute per charge. There are no awkward pipes, corners, or projections, the ⅓, ¾, or 1½-h.p. motor being built in.

The cake mixers have single lever control, and everything is enclosed, so that dust cannot penetrate nor the lubricant work outwards. The dough kneading machine has three wheels, and the 2-h.p. motor is mounted direct on the gear box, in the back of which is a pull-out panel housing the push-button no-volt release control gear. A portable 3 by 3 ft. electric baking oven has also been introduced as a single or double decker. The heating elements are contained in steam-tight compartments, are supported all along to prevent sagging, and operate at "black heat." Control is by a three-heat rotary switch with pilot lamps and thermometer, and a hand-wheel opens the door inward and upward in order to minimise hot air escape.



"Davenset" automatic vehicle charger and cinema arc rectifier (Partridge, Wilson & Co.)

Philco Radio & Television Corporation of G.B., Ltd.

All the receivers displayed are superheterodyne sets. Model 247 is for d.c., and has nine valves, including a ballast valve, a s.g. tetrode, two control h.f. valves, a diode detector, an a.v.c. valve, two l.f. triodes, and two push-pull pentodes, giving an output of 6 W. Band-pass aerial tuning is used, and tone control is provided as well as automatic and manual volume control. The dial is illuminated, and the large speaker is of the electro-dynamic moving-coil pattern.

A "Univolt" radio-gramophone equipment

There are handsome console cabinets for a.c. and d.c. mains operation, while the "X" models, including a radio-gram, are for a.c., and have two moving-coil loud-speakers, matched and balanced, mounted on an inclined sounding board with an echo-absorbing screen. The gramophone turntable is driven by a two-speed synchronous motor for standard 78-r.p.m. records and the new 33⅓-r.p.m. records, which play for nine minutes.

A short-wave convertor for connection to any a.c. receiver does not necessitate any wiring changes. An on-off switch automatically changes over the aerial for ordinary broadcast reception, and another switch gives three wavelength ranges from 200 to 16 metres. The valves are a full-wave rectifier, triode oscillator, and screen-grid tetrode detector. No reaction is used in the battery superheterodyne, the consumption of which is less than 10 mA; single-dial tuning, band pass, and a m.c. speaker are included.

Pressed Steel Co., Ltd.

A feature of the "Prestcold" refrigerator is that the storage space is sufficient for the normal family, yet the unit occupies a surprisingly small space. The heavy brass hardware is chromium plated, operation is silent, and there are eight freezing speeds. In the "De Luxe" model a pedal control is provided to open the door. A storage drawer and flat top give additional space.

Redfern's Rubber Works, Ltd.

The Company makes lettered advertising mats, rubber domestic furnishings, rubber flooring, ebonite and general mechanical rubber goods. The stand layout enables each of the Company's departments to arrange a representative display of its products in order to illustrate the developments that are taking place in numerous directions in the use of rubber in industry.

Smith's English Clocks, Ltd.

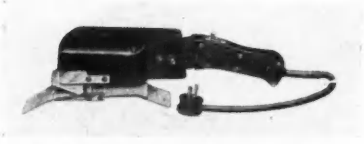
In this selection of clock movements fitted in many kinds of cases are a.c. synchronous timepieces, strikers, chimers, and a large variety of wall and exterior clock movements, also a number of electric turret clocks, new designs of bezels, and a recent striking movement, the chief feature of which is that it is very shallow and can therefore be fitted in modern cases suitable

for standing upon narrow mantelshelves.

Moulded "Bakelite" cases are available in a variety of colours and styles. Synchronous models need no winding, regulating, battery, or master clock. The 200-r.p.m. motor is not self-starting, and is made for direct fusible-plug connection to the ordinary 50-cycle 200-250-V house-service mains wherever a.c. supplies of controlled frequency are available.

Streetly Manufacturing Co., Ltd.

Plastic moulders to the trade, and specialists in mass production of "Beatl" and "Bakelite," this company also manufactures "Beatl" sheet in the



Electric shears (Rodgers & Sons)

form of panelling, such as is used in the B.B.C. dance band studio. Examples of mouldings for the electrical trades made specially to customers' specifications and requirements include lamp holders, switch covers, switch plates, plugs and sockets, standard table lamps, coil formers and bushings, etc. A completely moulded table lamp, including the shade, is illustrated. It is 12in. high, and complete with flexible lead and adaptor, costs 10s. 6d.

Joseph Rodgers & Sons, Ltd.

This company's electric shears (illus.) for cutting textile fabrics are now made in a range of three sizes. The smallest machine is for very light work, such as trimming. The latest model of the largest machine embodies a device for supporting it on the table; it is suitable for the wholesale tailoring and similar trades for cutting greater thicknesses, and even for cutting carpets. Having no motor or rotating parts, the machine is not subjected to so much wear as a rotary appliance, and even the largest size of shears is capable of cutting a single thickness of material efficiently.

These machines have been developed for use as bench fixtures where necessary.

Supertone Pianos, Ltd.

This company is making a dual home entertainer in the form of an ordinary piano in the top portion of which are incorporated a three-valve radio receiver and a moving-coil speaker, both of which are mains energised and obtainable for a.c. or d.c. The set is attached to the top door of the piano, the iron frame of which is utilised as an aerial.

The radio-gramophone is a handsome piece of furniture. In the central portion at the bottom are housed twin matched speakers; above them is the five-valve receiver, including rectifier and variable-mu valves with band-pass tuning; and on top are the motor-driven turntable and pick-up. On either side is a cabinet with glass door and side, the top of each forming a drop-front record drawer.

The "Derwent" radio receiver is obtainable for battery or mains operation. Three valves are used with tone correction and a moving-coil speaker. The chassis is all-metal, and the components are fully screened.

Synchronome Co., Ltd.

Though usually associated with electrical impulse dials, this company also produces slow-motion synchronous a.c. clocks, which are not self-starting, since it considers that it is better for a clock to stop than be wrong. Probable developments include a "jump centre-seconds" instead of the silent creeping movement. "Synchronome" equipment has been installed at Greenwich since 1924. For assisting the station engineers to keep their turbo-alternators to Greenwich time a frequency-checking clock is supplied which the company claims will enable an engineer at the switch-board to keep his set running within a second or so of standard time with the aid of a loud-speaker permanently tuned to the national time signal and automatically switched in at all right times, by which the controlling pendulum may be checked periodically. Original methods of turret-clock control and gear for automatically striking and chiming church bells are to be seen.

Telegraph Condenser Co., Ltd.

Among fixed condensers with paper and mica dielectrics for radio reception and transmitting purposes are high-voltage and high-frequency types, and, of course, the usual ranges for set manufacturers, besides specially designed varieties of inexpensive tubular patterns.

Electrolytic condensers are made of the aqueous kind for peak voltages up to 500 V and dry types, both in aluminium containers and waxed cartons, the latter in multiple blocks; also small ones specially intended for bias filtering. Condenser devices are available for eliminating interference with radio reception caused by d.c. motor-operated appliances, for ignition purposes, and for power factor correction.

Telephone Manufacturing Co., Ltd.

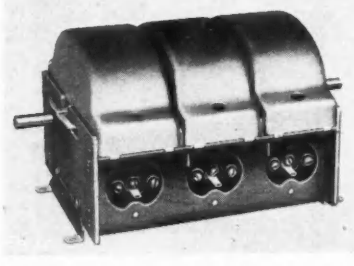
At Olympia in the Radio Section a range of new models of the "Temco" a.c. mains electrical clocks, in cases of burr walnut, mahogany, oak, and coloured "Bakelite" is being displayed. In addition to the models intended for use in private houses, a special display will be made of the synchronised clock system, controlled by a mains-operated master clock, for use in business and public buildings. A new design of motor and movement is incorporated in these clocks.

Part of the stand will also be devoted to automatic house telephones capable of giving intercommunication facilities in business premises of every kind and size.

Thermega, Ltd.

The most recent of these electrically heated pads and blankets is one specially intended for use in hospitals, with three-heat control. This is capable of providing a considerable amount of heat at very short notice.

The new blanket is fitted with a special detachable three-pin plug, which is non-reversible, so as to obtain the necessary



Wingrove & Rogers "Polar" ganged condenser

three heats constantly without being mixed up. A neon lamp in a special holder indicates when the blanket is "on."

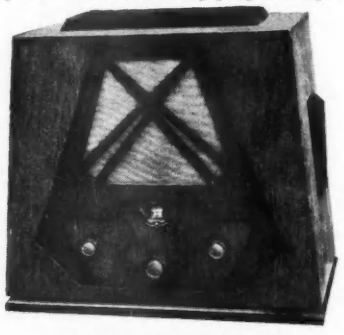
Univolt Electric, Ltd.

A self-contained electrically driven turntable and pick-up is an attractive device for converting a wireless receiver into a radio-gramophone. Its compactness is indicated by its dimensions, which are 10½ by 14½ by 4 in. to the top of the pick-up. The base is made of "Bakelite"; terminals are provided for connection to the radio set; and a mains plug-in adaptor with a length of flex for the motor.

The pick-up swivel head is mounted on a weight-adjustable arm, and the controls provided are an on-off switch, automatic start-stop lever, speed regulator, and a square law volume controller. For housing the outfit a handsome wood pedestal (illus.) is now available, either with or without a record cabinet below. The upper compartment is a pull-out drawer in which the turntable is accommodated, while the radio receiver may be stood on top. The cabinet is made of figured walnut with rosewood inlays, and ebonised handle and edges.

Violite, Ltd.

This company manufactures neon tubes. Of particular note are its display stands (illus.) of varied designs, made to produce red, green, and blue light. They are self-contained units with all the high-voltage apparatus housed in a properly earthed metal container. This arrangement makes it possible for the glass discharge tubes, although of different designs, to be all made interchangeable for simple insertion in the base. The unit is plugged straight into the mains socket by means of an ordinary plug or adaptor.



A Manuwares radio set

The company also supplies low-voltage luminous tubes, which are particularly adaptable for modern lighting, in standard 2-ft. lengths for 100-150 V and 4-ft. lengths for 200-250 V. They can be furnished with contacts right at the ends of the tubes, or, alternately, with contacts on the side about an inch from the ends. In the latter case a number of tubes can be put together in series so as to produce the effect of a continuous line. These "Zonelite" tubes can be bent into circles, right angles, etc. They operate directly off a.c. and d.c. mains, their temperature is very much lower than that of ordinary lamps, the loading is about 35 W per foot, and the life at least 1,000 hours.

In addition, the company is one of the few makers of hot-cathode X-ray tubes in this country, and it also makes scientific and hand-blown glassware.

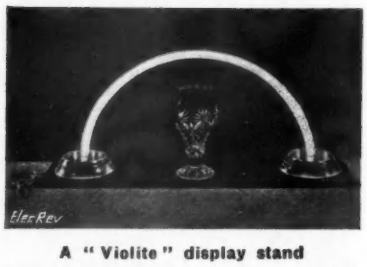
Vulcanised Fibre, Ltd.

Sheets, rods, tubes made of "Castle" vulcanised fibre include such special parts as vacuum cleaner extension tubes and nozzles, while railway track insulators are also manufactured.

Wingrove & Rogers, Ltd.

This company specialises in the design and manufacture of variable radio condensers. The range of three- and four-ganged models includes a "Polar Star" (illus.), which has a specially shaped stator in one of its three sections for use with the local oscillator of a super-heterodyne set, and the vanes are so shaped that a continuous separation of 110 k.c. is maintained over the whole scale when working with suitable tuning coils and oscillators. The steel U-shaped baseplate is made with flanged edges, and this, together with heavy section end plates, ensures exceptionally rigid construction. This is cadmium plated and sprayed. The phosphor bronze rotor bearings are spring controlled to ensure freedom from shake or end play.

The vanes are made of aluminium, and both the rotors and stators are machine assembled within very close limits. Universal feet enable the condenser to be mounted either on its base or on its side. Variable minimum trimmers are fitted to each section, and these may be operated by a screwdriver from the top



A "Violite" display stand

when the condenser is on its base without removing the covers. The adjusting screws maintain the same tension throughout their traverse, so that they cannot move, and thus the capacity remains unaltered. The vanes follow a mid-line law, and each section of the rotors is earthed and has a separate screening cover.

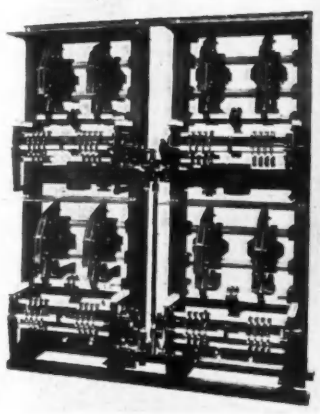
The latest "Uniknob" two-gang condenser will be on view complete with cover, and the selection of short-wave types will probably include a sample of a quite new variety.

The "Queen of Bermuda"

One of the most completely electrified ships in the world

THE new Furness Withy 20,000-ton liner, *Queen of Bermuda*, built by Messrs. Vickers Armstrong, Ltd., is undergoing its official trials this week. It is a sister ship of the *Monarch of Bermuda*, which has been running on the New York-Bermuda service for more than a year.

Each of the four propellers is driven by a 4,750-h.p., 3,000-V synchronous motor at 150 r.p.m. Energy is supplied by two 7,500-kW, 3,000-r.p.m., 50-cycle Fraser & Chalmers-G.E.C. turbo-alternators, to either of which any of the motors can be connected. Steam conditions are 350 lb. per sq. in. and 650 deg. F.; the vacuum is 28 in.



Direction contactor switches

The alternators are provided with closed-circuit cooling systems with tubular sea-water coolers. Mica and micanite insulation are used throughout. In order to avoid condensation when the machines are not in use two 1-kW electric heaters are embodied in the frame of each. Excitation is derived from the 220-V auxiliary supply, through a 23-kW negative booster.

The propulsion motors have salient poles with heavy damping windings in their faces to develop a high torque on reversal. The stator end shields are fabricated, and the stator can be racked clear of the rotor. A disc form of lubrication is used, in view of the long periods during which the motors run at low speeds. The enclosed ventilating system includes a motor-driven fan and tubular sea-water cooler. Electric heaters keep the windings dry when the ship is in port.

In starting, the turbines are run up to one-fifth speed and the fields of the alternators are then over-excited; the motors run up to speed as induction machines when their fields are switched on and they pull into step; the alternator fields are reduced to normal and the alternators' speeds can be varied from one-fifth to full load. Switching is carried out at low voltages, and the reversing switches are not required to break heavy currents.

Protection against earths and phase faults is on the McColl circulating-current system, but the beam relay is replaced by a more robust biased-disc instrument. The control gear is housed in steel cubicles in the centre of the engine room. Nine 0.45 sq. in. 3,000-V Pirelli-General cables connect the propulsion motors to the alternators.

The auxiliary engine room houses four Fraser & Chalmers-G.E.C. 750-kW turbo-generators. Steam conditions are the same as for the main turbines. The h.p. multi-stage turbines run at 6,000 r.p.m., driving Witton 220-V compound-wound generators through gearing at 750 r.p.m. The main switchboard is 60 ft. long and comprises 18 panels controlling the generators (4,000-A breakers) and feeders for various services. The auxiliary motors are controlled by plural starters.

Automatic tripping of non-essential circuits on overload permits the running of the generators up to capacity without endangering the supply for essential purposes. Essential services may be kept going in emergency by a 50-kW oil-engine set or by a battery which comes automatically into operation.

Power Services

Motors of up to 160 h.p. with an aggregate capacity of 5,000 h.p. have been installed for every possible purpose. Among these is the electric hydraulic steering gear (supplied by Brown Bros. & Co., Ltd.), which is of the four-cylinder type with two contactor-controlled 42-h.p. motors driving Williams-Janney variable-speed pumping units, and an emergency pumping unit driven by a 7½-h.p. motor operated from the battery. Two refrigerating plants have been installed by Messrs. J. & E. Hall, Ltd.; these require 23 motors, the largest of which (70 h.p.) drives a CO_2 compressor.

Ventilation throughout is on the "Thermotank" system, employing over 100 fans; the control of sixty of these units is from a central starting panel. All cabins and saloons are ventilated by Magnet ceiling fans or Gyro two-speed fans—the total being 600. The deck machinery supplied by Messrs. Clarke, Chapman & Co., Ltd., comprises a 150-h.p. naval windlass, four 75-h.p. warping capstans, and four 25-h.p. winches; the last-named are provided with portable controllers.

The lighting load is 450 kW. The first-class dining saloon with a floor space of 26,800 sq. ft. is illuminated by over 1,800 "Osram" lamps aggregating 39½ kW. The somewhat larger dance hall requires 54½ kW for its mobile-colour concealed lighting scheme.

There are eleven lifts in the boat, all supplied by the Express Lift Co. (a subsidiary of the G.E.C.). Three of these are geared variable-voltage controlled passenger lifts, four are direct-coupled goods lifts, and four are service lifts.

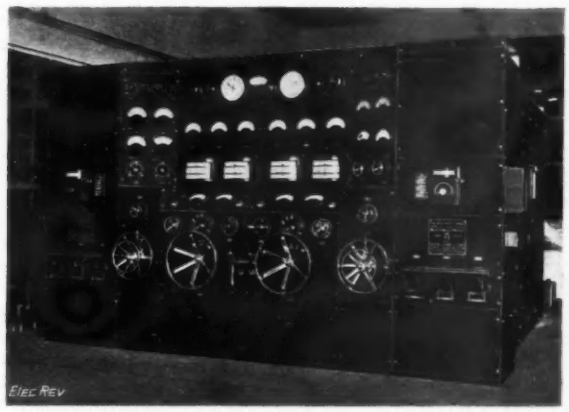
Electric Cooking

The maximum load required for cooking is 620 kW. Two island ranges consist of eight ovens, each 26 by 28 in. by 19 in. high with a loading of 5.4 kW. The enclosed tubular heating elements are mounted at the sides and bottom. Oven interiors, grids, pans, and browning shelves are constructed in monel metal. Asbestos lagging, 2 in. thick, is used for the ovens. A total of forty embedded hot-plates, 12 by 8 in., are arranged in groups of four on each of the hobs.

The combined hot presses and carving tables have monel metal tops, and tubular elements give top and bottom heat with three-heat control. There are fourteen of these, ranging from 2 ft. 9 in. to 12 ft. The three pans of the fish-fryer measure 24 by 16 by 8 in., and are fitted with a draining tap. The griller has four chambers, each 20 by 16 in.; the elements are carried on panels at the top of the chamber and can be replaced by lifting up the top plate. Four salamanders are designed on similar lines.

A 20-gal. water boiler has a copper interior, tinned inside and steel exterior with 2 in. of cork lagging between the inner and outer casings. Heat is obtained from two 4-kW blade immersion heaters inserted through the side. There are three hot-plates (24 by 18 in). As griddle cakes and scones require even temperature, the coils are carried on porcelain formers immediately below the top plate, and with each of the three heats the temperature is uniform over the whole surface.

Other heating equipment installed includes two deck baking and confectioner's ovens, confectioner's range, thirty-nine warming plates in the dining saloons (10 kW total), five 1.75-kW deck-mounted and nine 0.75-kW bulkhead-mounted hot cupboards, 50-W towel rails, waffle irons and automatic toasters.



The propulsion control switchboard, 3,000 V, 3-phase, 50 cycles

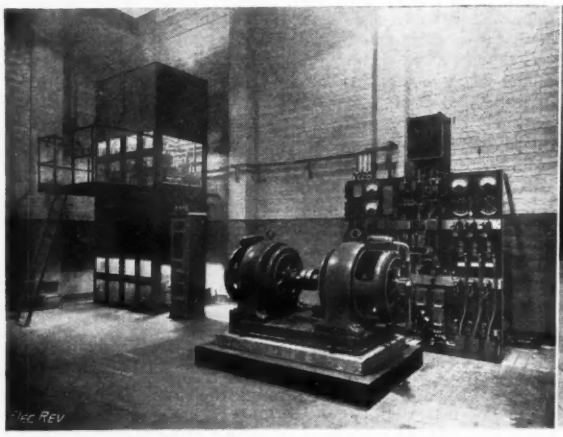
A 430-line central battery switchboard is connected with a hand combination telephone in every cabin. A Magnet fire-alarm system gives warning to the officer on watch with an indication of the origin of the call. The General Electric Co., Ltd., supplied the whole of the electrical equipment described above.

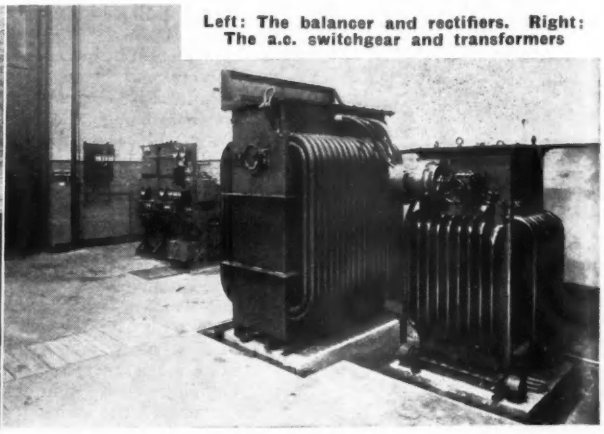
The vessel is also equipped with Marconi wireless telegraph and telephone apparatus, which includes a direction finder, life-boat telegraph equipment, a band repeater and broadcast receiver for music and announcements.

The telegraph installation consists of a 2-kW Marconi valve transmitter and an emergency ½-kW spark transmitter with a receiver covering the full commercial range of wavelengths of all types. The telephone transmitter covers wave bands (between 16 and 55 metres for telegraphy and 16 and 140 metres for telephony) held constant by master controlled oscillators. The receiver covers similar wavelengths and the volume is maintained by auto-gain control.

A Remotely Controlled Rectifier Sub-station

AT Lynton Road, North Acton, about a mile from the Southfield Road sub-station, in order to make provision for the increasing load in this neighbourhood, a new d.c. rectifier sub-station of 500-kW capacity at present, but of an ultimate capacity of 2,000 kW, has been installed by the Metropolitan Electric Supply Co., Ltd. This has relieved Southfield Road of considerable load, permitted busbar pressure reduction at the old centre, afforded a network voltage increase in the area concerned, and generally conserved copper. The new equipment is arranged for remote control from Southfield Road and also for hand control. Loop-in and -out 6.6-kV cables connect two 300-A units of Switchgear and Cowans "Whitehead" e.h.p. equipment. Potential metering transformers on the busbars also supply the starting motor of the 500-kVA rectifier switch. Mr. Stanger, of the Hewittic Electric Co., Ltd., which concern had the contract for the whole of the electrical equipment, said that this was the first a.c. motor that he had seen installed for such duty.





Left: The balancer and rectifiers. Right: The a.c. switchgear and transformers

There are duplicate busbars on the switchgear, and the rectifier unit is equipped with selective switches, while all units have mechanical selective gear with suitable protective locking. There is Metropolitan-Vickers overload and leakage protective gear on the rectifier unit, and Landis & Gyr trivector equipment meters the supply.

A 500-kW Hackbridge transformer has its 6.6-kV 3-phase primary winding in delta and its 12-phase secondary in star. It is fitted with external off-load tapping for ±2½, 5, and 7½ per cent. voltage variations. In the tank, but separate from the larger unit, is a small transformer with a 6.6-kV primary and a 110-V 3-phase secondary for the rectifier fans and a 70-V single-phase secondary for the rectifier excitation. The Metropolitan-Vickers spark gaps on the transformer are in parallel with the anodes which they protect. A 555-V 3-phase secondary winding on the main transformer supplies the rotor of the Switchgear & Cowans 42.75-kVA induction voltage regulator (secondary volts 6,105-7,095). The regulator motor can be hand-controlled, but the Lancashire Dynamo & Crypto d.c. operating motor is normally remotely controlled.

The Rectifier Equipment

There are four 150-kW rectifier bulbs arranged in pairs on the two "geometrical" 12-phase supply circuits, so as to preserve balance. The four bulbs are arranged in two tiers, the top and bottom pairs being those referred to in connection with the a.c. supply, whilst each side pair (one top one bottom) is governed by its own d.c. switch. Of special interest is the provision for regulating the speed of the fans according to the load. The two outer phases of the fan supply circuit have coils superimposed on d.c. coils on the negative in a special choke. This arrangement is expected to contribute largely towards a ½ per cent. increase in the overall efficiency of the sub-station, which at present on full load is well over 90 per cent. The main anodes are connected solid, and the fans and the bulb excitations are switched separately in pairs. A Brookhirst control and protective panel is fitted with voltage relays connected to the 480-V d.c. busbars which, through contactors, operate the regulator motor either way. A protective relay has one coil connected phase to neutral, and the other (overload) is in series with the current transformer of the regulator. The phase to neutral coil is in effect a no-volt coil which controls the voltage relay.

Through d.c. isolator switches in the rectifier equipment supply from the cathodes is *via* one busbar to a 1,200-A positive magnetic blow-out switch on the Bertram Thomas d.c. board. On the control board are raise and lower relays which operate voltage relays in the Brookhirst control panel; start and stop contactors controlling the rectifier-switch motor; close and open contactors operating the solenoid on the mechanically coupled positive and negative breakers; an alarm relay which operates a bell at Southfield Road if a bulb fails; and a bridging contactor which provides the necessary "potentiometer" connection between the sub and the network. Controlling the outgoing feeders there are Admiralty type magnetic blow-out fuses (the company has fuses of this type satisfactorily carrying 800 A).

The switchboard instruments are served by multi-contact switches. There is a 200-A (mid-wire) E.C.C. balancer of standard construction with cross-connected fields. But an unusual point is that this remotely controlled machine can be run on the network without the rectifiers. The machine is push-button controlled from Southfield Road through timing switches, and in the event of a network failure a "hammer"-throw-over switch on the d.c. board connects the balancer to the rectifier. A 27-Ah battery, supplied by Alton Battery Co., provides for emergency lighting.

Control Methods and Construction

The d.c. system is 480/240-V 3-wire. The panel at Southfield Road is simply equipped with the necessary push switches, alarm relays, ± voltmeters, an ammeter, and a throw-over switch for emergency starting. All of the operations are conducted on four pilot wires (telephone pilots in an existing cable) and earth, and operation is normally at 240 V from Lynton Road. As soon as the a.c. switch at Lynton Road closes it changes over the pilot equipment for subsequent operations by mechanically operating an auxiliary switch in the rectifier circuit breaker. The sub-station building is 32 ft. long, 24 ft. wide, and 24 ft. high, and its curious external appearance is due to its shape and the entire absence of windows. The company's explanation of the somewhat elaborate building is that it had to conform with the style of building prevalent in this good residential neighbourhood.

An excellent system of convection cooling is aided by the rectifier fans. Above the rectifier equipment there is a cowled hole in the roof. The opposite wall is double, and the cavity is open but cowled at the top. There is an air inlet in the inner wall at the bottom. To eliminate noise and vibration special foundations under the balancer and transformer each consist of a heavy concrete bed on compressed "Paxfelt" acoustic felt and rubber strips, alternating, on "Thatchboard" panels covered with plastic rubber. These special materials were supplied by Newalls Acoustic Products, Ltd.

The "Metesco" staff under Major Richardson are to be congratulated not only upon the up-to-date architecture of the building, but also upon the compact layout.

Arcs in Closed Vessels

The Safety in Mines Research Board has issued a paper (No. 77, Stationery Office, 6d.) on "The Pressures Produced by the Striking of Momentary Arcs in Closed Vessels" by T. S. E. Thomas. The work described in the paper was undertaken to obtain information regarding: (1) the maximum pressure produced and its relation to the energy set free during arcing; (2) the form of the pressure-time curve; and (3) the effect of the material of the electrodes between which arcing occurs. For accurate measurement of sudden pressure pulses of high magnitude, a new form of monometer was constructed; this is described in an appendix. The principal conclusion drawn from the investigation is that, within the limits of power of arc employed, no "pressure-pulse of high magnitude is produced on the striking of an arc. The pressure produced within a closed vessel is proportional to the arcing energy and is greater with aluminium than with copper electrodes.

The Story of the Shannon. By Robert N. Tweedy

A tale with a moral

THERE is no doubt in the minds of those who really know a good deal about electricity supply conducted on modern business lines that the national supply in the Irish Free State, although only now completing its second year of normal trading, is sliding into a state of stagnation. This is traceable directly to political interference, which culminated during the 1931 summer session of the Dail in a most unholy flare-up, wherein two members of the Board were forced to resign and the Board was made subservient to the Ministries of Industry and Commerce and of Finance, instead of being almost autonomous, and, by intention, but obviously not in fact, completely free from political interference.

Notwithstanding the *liaison*, as it was called euphemistically, which the Minister forced upon the Board, and the new chairman and two or three new members installed at the instance and from the choice of the Minister, accounts for the period ended March 31st, 1931, were completed only in time to be presented to the Dail with the 1931-32 accounts on February 8th, 1933.

Increase in Charges

Incidentally it may be observed that the injustice done to the first managing director, Dr. McLaughlin, the scapegoat for the accounts muddle, has been removed in some degree by his reappointment to the Board during the past year, but, unfortunately for progress, not in time to prevent the Board's taking the fatal decision to impose very heavy increases on the rates of charge for almost every classification of consumption except motive power. That decision appears to have been taken within a few months of the close of the first normal trading period, 1930-31, which also was an almost inconceivably abnormal accounting year, as stated above.

The position disclosed by the accounts now published can be gauged roughly by the following extracts. No provision has yet been made for sinking fund in respect of repayment of capital.

1930-31. (Period represents only partial utilisation of the system, but reflects also only part of the interest charges for a full year on the capital involved.)	£
Interest charges	359,500
Liabilities in respect of local authority undertakings now merged in national undertaking	95,700
Total	£455,200
Deficiency	£200,000
Revenue from sale of energy	£735,000
Total capital receipts outstanding	£8,236,000

1931-32. Full year's interest on constructional works, and on direct advances to the Board.	£
Interest charges	455,000
Liabilities in respect of local authority undertakings now merged in national undertaking	93,000
Total	£548,000
= 57.1% of gross revenue from energy sales.	
Deficiency	£24,600
Revenue from sale of energy	£939,000
Total capital receipts outstanding	£9,191,472

The knowledge that the undertaking is required to begin repayment of capital during the 1933-34 period seems to have scared the Board so badly that it "found it necessary, as from December 10th, 1931, to increase certain tariffs for general domestic and lighting supplies," and it states that "the amount of additional revenue so obtained for the period ended March 31st, 1932 [rather more than one quarter] was £25,000."

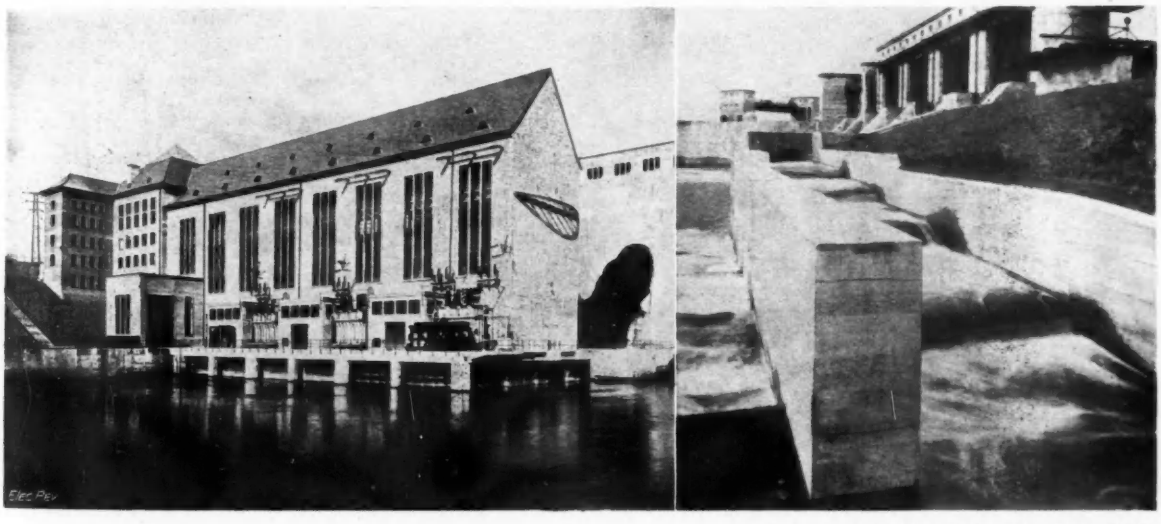
The tariff generally in use is of the two-part type, the fixed charge being a percentage of the valuation. No economy exercised by the consumer can prevent the undertaker collecting in full an increase on the fixed charge, and the increase in this case ranged from 10 per cent. and 12½ per cent. in Dublin and Cork to 25 per cent. everywhere else. It will be seen, therefore, that an extra collection of £25,000 per quarter is a simple matter so long as consumers remain connected in sufficient numbers.

The following table shows the output to March 31st, 1932:—

Year.	kWh Generated.	kWh Sold.	Average Price per kWh	
			Generated. Pence.	Sold. Pence.
1929-30	60,947,775	43,177,228	1.88	2.66
1930-31	119,842,716	85,500,494	1.47	2.06
1931-32	151,843,717	110,677,196	1.42	2.04

In addition 2,731,800 kWh was sold in the second period by 103 authorised undertakers beyond the present scope of the Board's networks. The total installed capacity of plant in the three power stations owned and operated by the Board was approximately 109,500 kW., assuming maximum head of water at Ardnacrusha, and 93,500 at the lower head limit. The number of consumers at March 31st, 1930, was 47,229, at March 31st, 1931, 67,668, and at March 31st, 1932, 77,134.

It is a foregone conclusion that the net rate of increase in connections has slowed up very considerably since the rates were increased. For the same reason several hundred wiremen have been disemployed, contractors are in despair, and the Dublin Gas Company has built magnificent new showrooms and is having the busiest time of its life.



By courtesy of the Electricity Supply Board, Dublin

The Ardnacrusha power house of the Shannon Scheme, and a section of a fish pass at the weir dam

The population of the Free State is 2,900,000, and 841,000 (29 per cent.) of these are within the areas served. The number of kWh sold per consumer rose from 1,263 in 1930-1 to 1,436 in 1931-32. The consumers at, say, five persons per consumer, represent about 46 per cent. of the population of the area served.

The Area Served

The term "area served" is very indeterminate for purposes of statistical calculation. A glance at the following table will suggest the danger of assuming that effective potential service is available for the majority of the population outside the towns:—

DISTRIBUTION OF CONSUMERS, 1931-32.

District.	Total Population.	No. of Consumers.	Percentage of Total Consumers.
Dublin	385,000	43,600	57
Dublin and Cork	499,000	51,000	66
Dublin, Cork, Limerick and Waterford	645,000	61,691	80
The rest	196,000	15,443	20

Taking that and the table below in conjunction we get an interesting study.

The cost of generation in 1931-32 (from Revenue Account) was £51,162 or 0.081d. per kWh; transmission costs were £9,345 (0.015d.); distribution costs £86,075 (0.136d.); and general management and overhead expenses, £244,846 (0.387d.); giving a total of £391,428, or 0.619d. per kWh.

DISTRIBUTION OF kWh GENERATED OVER AREA SERVED.

District.	Percentage of Total.	
Dublin (City and Suburbs, as before)	57.8	
Dublin and Cork	68.2	
Dublin, Cork, Limerick and Waterford	75.6	
Losses and "house" use	15.0	
		90.6
Leaving for rest of area "served"		9.4
		100.0

The Board has estimated that it will be generating 200 million kWh in 1933-4, but it is impossible with the increased rates upsetting everything for anyone to make a reasonably approximate forecast. The Board is budgeting for an average annual increase of 14 per cent. on energy generated, which in any event is a very uninspiring outlook for a national enterprise purporting to supply a country which was using less than 20 kWh per head in pre-Shannon days.

To "stage a come-back" for this splendid young national undertaking it will be necessary for the present Government to restore to the Board its original powers and responsibilities; to make sure that engineers rather than civil servants initiate, direct and administer policy; and to grant power to the Board to raise new capital as and when it becomes necessary to do so.

Undoubtedly a healthy Board freed from fear and an inferiority complex would not only immediately reduce rates to their pre-panic level, but make some very necessary concessions to encourage the domestic consumer.

The Irish Free State tried to run its finely conceived National supply programme without an electrical engineer on the Board for rather less than two years, and the result has not been encouraging. Now that the expert engineering component has been re-assembled in the Board's make-up there is more likelihood that the undertaking will pull through a highly critical period, but there would be more ground for hope if the Board's freedom of action had not been hampered by politicians.

The present situation seems to be that the Board cannot carry out the smallest extension without obtaining the specific sanction of two Ministers of State, which means, of course, a series of permanent civil servants who have not the necessary experience to express an opinion either upon technical matters or questions of supply economics.

In the Courts

IN the King's Bench Division last week the case of McMichael Radio, Ltd., against Mr. Samuel Parnes, a merchant, of Elizabeth Street, Cheetham, Manchester, came before Mr. Justice Swift, an action brought by the plaintiff company to recover £480 alleged to be due on a dishonoured bearer cheque given by the defendant on a sub-underwriting agreement by which the defendant undertook to underwrite 2,400 participating preferred shares and 2,400 ordinary shares of the company. The agreement provided that the issue was to be made on or before December 15th last.

According to the plaintiffs' case the prospectus was issued on December 1st, and December 7th was the date of the allotment. When the defendant's cheque was presented it was returned marked "payment countermanded."

Mr. Parnes pleaded on a defence that he only undertook to underwrite the shares on the understanding that the issue was not to be made before December 15th.

Having heard the evidence his Lordship gave judgment for the plaintiff company for the amount claimed with costs.

Appeal in Action Against L.J.E.A.

In the Court of Appeal on Monday before the Master of the Rolls and Lords Justices Lawrence and Romer, Messrs. Handcock & Dykes, consulting engineers, appealed from a judgment of Mr. Justice Luxmoore in the Chancery Division in the action which they brought against the London & Home Counties Joint Electricity Authority and the Leatherhead and District Electricity Supply Co., Ltd., for a declaration that, under the terms of an agreement made between them and the defendant company dated March 19th, 1928, both sets of defendants were liable to pay to the plaintiffs in each year of the currency of the agreement a sum equal to 5 per cent. upon the capital outlay (excluding cost of land) laid out in extensions, reconstructions, or conversions of the Leatherhead undertaking.

Mr. Miller, K.C., and Mr. M. Stevenson appeared for the appellants, and Mr. Spens, K.C., and Mr. Beney for the respondents.

It appeared from the statement of Mr. Miller that the defendant company by the agreement agreed to employ the plaintiffs as consulting engineers for ten years as from January 1st, 1928, and thereafter from year to year, and terminable by one year's notice in writing on either side. By the agreement the plaintiffs were to advise the company in connection with the undertaking in Leatherhead or any extensions or reconstructions or conversions thereof and during such period should make reports and generally advise the company in respect of matters affecting the company. The plaintiffs were to be paid £210 a year and clause 2 of the agreement provided that when the company decided to proceed with any extension or reconstruction of the existing undertaking the consulting engineers when so instructed would proceed to prepare detailed plans and specifications and obtain tenders for work and give all necessary instructions to the contractors or others engaged thereon, purchase and pass plant, direct the construction and certify its due completion. Clause 3 provided that the company should each year pay to the consulting engineers for those services 5 per cent. upon the total capital outlay during the year upon such extensions, reconstructions, or conversions whether carried out completely by contractors or partly by the company's own staff, the 5 per cent. to be charged on the capital outlay during each year whether charged by the company against new or existing capital or paid for out of revenue or by consumers.

Mr. Miller said that as from January 1st, 1931, the Leatherhead undertaking was transferred to the J.E.A., and as the plaintiffs were at all times ready and willing to render to the company or the J.E.A. the services contemplated by the agreement he submitted they were entitled to the relief they claimed under clauses 2 and 3 of the agreement. The plaintiffs' case was that in 1931 capital was expended on extensions, &c., of the Leatherhead undertaking, and plaintiffs were entitled to accounts showing the amount of capital laid out during that year and in respect of which the plaintiffs claimed remuneration.

The hearing was adjourned until Thursday.

The Second Five-Year Plan

THE first Five-Year Plan of the U.S.S.R., inaugurated in October, 1928, ended on December 31st last, and, according to official figures, the plan, as a whole, succeeded to the extent of 93.7 per cent. of the estimates; in heavy industry the plan reached 108 per cent. of the original estimates. With the New Year the second Five-Year Plan commenced, and the programme for 1933 has just been published.

The programme provides for the putting into commission this year of 1,100,000 kW of new generating plant, of which about 750,000 kW will be installed at the large regional power stations. The total installed capacity of all stations will be raised from 4,600,000 to 5,700,000 kW, *i.e.*, an increase of 23.6 per cent., and that of the regional stations from 2,690,000 to 3,440,000 kW. It is expected that, with the aid of the additional plant 16.3 milliard kWh will be generated during the year, as against 13.3 milliard kWh in 1932—an increase of 22 per cent. A grant of 680 million roubles has been approved for expenditure during 1933 on new stations and extensions.

In planning the new generating plant the main attention has been directed to the strengthening of the power base in the large industrial regions and to the extension of the stations where local fuel or hydraulic power is utilised. In the Moscow district, one 50,000-kW set will be added at the Bobriki station working on Moscow coal, and one 40,000-kW at the Shatura station working on peat. The 60,000-kW, 130-atm. set at the power station of the Moscow Thermo-Technical Institute will also be put into commission during this year; this set will supply heat in the form of hot water and steam, in addition to electric power, for industrial and domestic uses. In the Leningrad district 96,000 kW is to be installed at the hydro-electric station on the River Svir, and two 50,000-kW sets at Dubrovka station working on peat. The 220-kV transmission line from the Svir station to Leningrad also will be put into commission. The power base of the Ural will be considerably strengthened, as in this region the requirements of the metallurgical, chemical and machine building industries cannot be satisfied by the existing stations. In addition to the large stations, a number of small stations aggregating about 50,000 kW will be started up.

The electrical manufacturing industry, in common with other heavy industries, is to increase its output by 21 per cent. In addition to the reconstruction of the existing works, the turbine works in Kharkov and several works in Moscow will commence operation during 1933. The mastering of the new technological processes and of the new works built under the first Five-Year Plan, an increase of 16.5 per cent. in production efficiency, and a decrease of 5 per cent. in self cost of production are the principal points of the plan for 1933.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

Luminous-discharge Tube Lighting

AS Mr. C. C. Paterson was not able to cross to Dublin to deliver his lecture on "Luminous-discharge Tube Lighting," his chief laboratory assistant, Mr. N. L. Harris, deputised for him.

A cheering feature about these Dublin meetings is the large number of students at one or other of the Universities who attend, and sometimes are not too diffident to speak. That sort of thing deserves encouragement.

Difficulties of transport made it impossible to show working examples of the hot-cathode lamp, but the plain and coloured drawings thrown on the screen proved admirable substitutes.

The lecture had been delivered already before the Illuminating Engineering Society at the Wembley Research Laboratories of the G.E.C. (see ELECTRICAL REVIEW, November 11th, 1932). The limits set by theoretical considerations to the progress of the discharge tube are far wider than physical laws permit in the case of the filament lamp. The luminous efficiency already attained is from two to five times that of the gasfilled tungsten filament, and is sure to go much higher, whereas the filament lamp probably has reached its zenith in that respect.

There is as much advance to be made with the discharge lamp as there was to be made in 1878 in the first Swan lamp.

The cold-cathode tube, so widely known as the neon lamp, suffers from inherent disabilities which debar it from general use. It performs excellently under the special conditions for which it is suited. The voltage required to start discharge is much higher than supply pressure, and it rises rapidly with decreasing gas or vapour pressure within the tube. The normal phenomena of "sputtering," caused by the impact of positively charged gas ions at the surface of the cathode, gradually immobilises gas atoms, at a rate depending upon the current density on the cathode area, until ultimately the voltage drops per foot of tube is too high to allow discharge to pass.

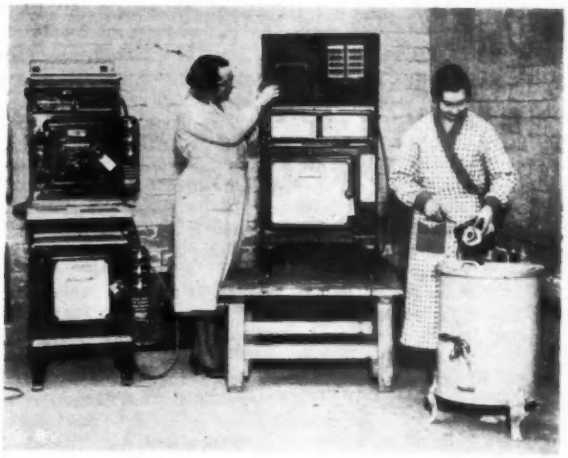
Heating the Cathode

Heating the cathode, as certain valve cathodes are heated, permits the current to be enormously increased; this could be done in the cold tube only by using quite impracticably large cathodes. At the same time the length of tube is shortened and the voltage drop per foot is greatly reduced. The cathode fall is reduced to 25 or 30 V, and no appreciable sputtering occurs.

The current value is limited only by the softening point of the glass, and we have now a gas discharge tube which can be used on supply pressures.

A small choke coil is needed to limit the current on account of the voltage drop decreasing as the current rises, and the momentary high starting voltage is obtained by means of a small high-frequency Tesla coil.

Research work is proceeding with very promising results upon the remaining obstacle to production for general purposes, namely, the gas or mixture of gases which will give a more natural spectrum than is obtainable at present.



Miss Dyer and Miss Crossley, two of the Yorkshire Electric Power Co.'s lady demonstrators, whose duties consist of showing those interested in domestic electrical appliances how to get the best out of their apparatus

The Distribution Question

THE second evening's discussion on the I.E.E. paper by Mr. J. M. Kennedy and Miss Noakes (the first was reported in our last issue) took place on February 9th.

Mr. J. R. Beard suggested that the paper was complementary to those read by Mr. Haldane and himself and by Messrs. Dickinson & Grimmit, and he believed the three papers covered the whole field of distribution. He strongly supported the authors' main deduction that the next stage of development was the formation of distribution areas, which should be large not only for technical reasons but also with a view to standardisation of voltages, tariffs, and sales policies. A rapid increase in the consumption of electricity might confidently be anticipated with a tariff of ½d. per kWh and a fixed charge of £5 per annum per consumer.

Col. R. E. Crompton strongly opposed the establishment of large distribution areas because of the many classes of consumers to be catered for. The distribution of electricity was not so much a job for engineers as for the commercial traveller and salesman; consumers must be obtained by meeting their requirements suitably and through propaganda by the Electrical Association for Women. He had not been able to come to any satisfactory conclusion regarding two-part tariffs, and had been using a double tariff, according to the hours of use, for many years quite satisfactorily. It had been stated that the grid would result in increasing prices for electricity supply, but it was to be hoped that those engaged in the industry would co-operate with the Central Electricity Board with the object of making electricity available at the cheapest rate and of assisting the industries of the country to be spread over much wider areas.

Value of the Domestic Load

Mr. Arthur Ellis said that during ten years of acute industrial depression supply undertakings had spent £20,000,000 per annum, the average for distribution being £12,500,000 per annum. The total output for March 1931-32 very closely corresponded with the forecast in the original curve of growth for the country, which was prepared in 1926 as a preliminary to the framing of the new regional schemes. The loss of industrial demand had been more than made good by the progress in the domestic demand. Unless the kWh charge of a two-part tariff was under 1d. people would not use electricity to the desired extent for domestic purposes. It had been suggested to him that the charge should be on the same basis as that for water, viz., a charge based on the rateable value of the premises with unlimited use. No details were given as to how the distribution boards would operate or get the money to purchase the undertakings; they could not give the same security for income as could the Central Electricity Board.

Mr. T. G. N. Haldane expressed the view that the authors' case would have been strengthened if they had shown how distribution capital during the past ten years had been allocated as between rural and urban areas. The establishment of distribution boards would considerably reduce the number of authorities, which at present totalled 663, and operating over large areas, would be less restricted by considerations of dividends and contributions to rates.

Mr. J. I. Bernard pointed out that the number of consumers had been doubled in five years so that by 1938, at this rate, all the houses in the country would be connected. The authors made no reference to the business aspect of selling electricity—salesmanship, publicity, demonstrations to the public, &c.—and seemed to imply that with a low tariff electricity would sell itself, but that was to put the cart before the horse. Some districts were too small for economical development; in others electricity and gas were under the same ownership, and this had a very important influence.

Mr. A. C. Sparks criticised the omission of all reference to standardisation in connection with the grid, the installation of switchgear of larger rupturing capacity, and the development of sparsely populated areas which affected capital expenditure or of the restrictive effect of all legislation hitherto.

Management Costs

Mr. D. J. Bolton criticised the figures taken as cost of management. For the whole country the amount was 14s. 5d. per kW installed, but the authors had allocated only 2s. 2d. of that to generation. That sum related to very large undertakings, whereas the authors had applied it as an average for the whole country.

Mr. W. A. Ritchie said that formerly the practice was to

demand a revenue equal to 20 per cent. on the cost of the main, but nowadays a supply was given as long as there was a sporting chance of getting a suitable return. Water heating would not be economic unless the charge was below ½d. per kWh.

Mr. J. F. Shipley said that our price level was higher than in any other country in the world, but in spite of that we had progressed. In the United States the industrial depression had had very little effect upon the revenue per domestic consumer, and the position should not be any different in this country.

Mr. J. N. R. Perks suggested that a levy on undertakers should be made by the Electricity Commissioners for national and local publicity and administered by the E.D.A. He hoped that the right of a local authority or a number of consumers to apply to the Minister for a reduction of price would be extended to include the introduction of two-part tariffs or suitable domestic rates.

Mr. Kennedy, in the course of his reply, denied any intention to belittle the progress that had been made by a number of undertakings. He believed that the difficulty of selecting the members of the proposed boards would be much less than that of selecting the very much larger number of members of electricity committees and boards of directors. In Winnipeg, 75 per cent. of the population of 219,000 was connected, and 57 per cent. of the population cooked electrically. The average number of kWh per consumer was 4,169 and the average price was under ½d. Although 30 million people in Great Britain lived in areas supplied to a limited extent at 1d. per kWh, only 30 per cent. of the population in those districts was actually connected to the mains. In London there were thirty-eight local authorities and fourteen companies supplying electricity on different tariffs and on different systems, even in the same street. There was not the slightest doubt that the Labour Party, if returned to power, would co-ordinate distribution by much more drastic methods than could be achieved by more or less voluntary effort at the present time towards putting our house in order.

Modern Battery Practice

IN a paper read before the Association of Mining Electrical Engineers (London Branch), Mr. F. Crawter discussed "Lead Storage Batteries and Their Treatment." He said that the two principal things to avoid as far as possible when charging a battery at high rates are heating and gassing. A reduction in the charging voltage is desirable when gassing starts in order to avoid its scouring action on the plates. If charging is carried out at a constant pressure of 2.3 V per cell there is no fear of overcharging, and the charge can be completed at a constant pressure of 2.6 V per cell.

The traction battery can be boosted at any rate which will not cause the temperature to exceed 110 deg. F. or cause free gassing except at low charging rates. Boosting for short periods at rates up to five times the normal is permissible, so that a capacity varying from 50 per cent. upwards of the normal is available in an hour, depending upon the extent to which it was discharged prior to the boost. For traction work, where high working rates are demanded with a minimum of space and weight, the choice seems to lie between pasted positives with glass wool separators and positives in which the active material is contained in ebonite tubes slitted horizontally so as to allow the electrolyte to gain access to the active material; down the centre of each tube is an antimonial lead rod. A plate measuring 6 in. by 8½ in. can be discharged at 67 A for ten minutes without injury.

Corrosion has been eliminated by lead-coating all copper strips used for inter-cell and inter-row connections and by lead-burning throughout the battery. Many improvements in detail have very considerably increased the average life compared with that obtainable ten years ago. Mr. Crawter also described the method of trickle charging for standby batteries, which was the subject of an article by Mr. E. R. Sanderson in our issue of February 10th.

The discussion became mainly a series of questions put to Mr. Crawter. The following points are taken from the replies which he made at once to each speaker. The successful production of nickel-iron batteries (which Mr. H. M. Morgan and Mr. J. A. B. Horsley stated were coming into use for lamps in collieries) depended largely on the personal equation. The specific gravity of acid in lead batteries varied from 1,215 in stationary cells to 1,280 in traction cells, where the acid space was limited. The term "trickle-charging" meant only the counteracting of open-circuit losses. The system had not been applied underground, but was in use in many grid sub-stations. "Gel" electrolyte was unspillable, but its use reduced the capacity of a cell by 25 to 30 per cent., and also the efficiency. Nothing had been done yet with the Drumm battery that could not be done with half a dozen lead batteries, *i.e.*, small discharges and boosting at high rates.

The cause of buckling was unequal action on the two sides of a plate, but with new batteries it had disappeared. Oil could be added to the electrolyte as a deterrent to gassing, provided the plates had not to be removed, as it was a difficult and lengthy process to clean them with blotting paper. Lids could be used only on batteries up to 200 Ah in capacity. Sulphation could often, but not always, be got rid of by prolonged charges at very low rates. With trickle-charging there was no excuse for sulphation and the process could be continued indefinitely. It could be applied to car batteries for keeping them in condition; 1 mA per Ah would be required.

The Grid—For and Against

AT the last informal meeting at the Institution of Electrical Engineers, under the chairmanship of Mr. J. F. Shipley, a discussion was held on "The Grid and its Fulfilment of National Requirements."

Mr. E. R. Wilkinson, deputising at short notice for Mr. H. Hobson, claimed that the grid had already conferred a very great boon and could be criticised only by those who overlooked that a discussion on it was being held years too early. The grid was not in full service yet, but it had already been a most potent instrument for encouraging the public to become "electrically minded." It had been shown that the cost of the grid system would be very appreciably below the estimated cost of inter-connecting the existing stations.

The grid was bringing supply to areas that otherwise would not have been touched—areas which no private undertaking would formerly consider, and, given a recovery of industry and a continuance of the remarkable growth of the domestic demand, it was likely to achieve all that had been hoped for. Further, it had provided manufacturers with immense experience in the construction and erection of large-capacity equipment. This had brought the industry world-wide fame, and at a time of unprecedented industrial depression had produced a great amount of employment, which also was a great national requirement.

Mr. C. S. Davidson acknowledged the national value of the achievements of the engineers and manufacturers and the impressive effect the enormous engineering work must have upon the world at large, but he believed the estimates of financial success were too optimistic.

The greater part (80 per cent.) of the electricity generated in this country was from large selected stations which would need no grid system of distribution, so only 20 per cent. of the total would be sent over this elaborate service. Less efficient stations would be shut down with consequent savings, but that was not enough. The cost of the coal saved was considerable, but even this did not warrant the extravagant claims that had been made for this means of providing industry with "a cheap and abundant supply" of power.

The Creep of Steel

At air temperature a steel may be said to have a definite tensile strength, ultimate stress, but when it is hot the stress required to cause failure depends on the time during which it is applied. The relation between applied stress and time to fracture is roughly hyperbolic, that is, the time for failure to occur increases rapidly as the stress is decreased. The increased length of life is due to the decreased rate of elongation with time, creep rate, but although the creep rate decreases rapidly with stress, creep may still persist at very low stresses compared with that which is necessary to produce failure in a few minutes. These matters are discussed by Mr. H. J. Tapsell in the paper which he read before the Chemical Engineering group of the Society of Chemical Industry in London on February 10th. Methods of determining creep properties are considered, and the research which is being carried out at the National Physical Laboratory is referred to.

I.E.E. London Students

The programme for the second half of the session of the London Students' Section of the Institution of Electrical Engineers has now been issued. The arrangements include six technical meetings, six visits to places of electrical interest, a dance, and the 26th annual (informal) dinner. The subjects, starting with a paper on order signalling on February 17th, include electricity in farming, turbo-electric marine propulsion, cable laying, h.v. circuit breakers and fuses, as well as an address by Professor E. W. Marchant, the president. The dance will be held on February 21st (double tickets, 7s. 6d.), and the dinner on March 22nd (tickets 5s. 6d). The attendances at meetings have so far been very encouraging, and it is expected that the session will prove a record in that respect. The standard of the discussions has also been high. Owing to pressure of special work, Mr. F. G. Tyack has had to hand over his duties to Mr. J. H. Marsh, 8, Wellington Road, Charlton, S.E.7, who will act as honorary secretary.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Slide Rule Decimal Points

In connection with the use of the slide rule, I would like to draw the attention of your readers to a method of finding the position of the decimal point. I find that so many engineers rely on making an approximation for this purpose that I am led to the conclusion that the use of the "digit" system does not find much favour.

The method I am about to describe is very easy to understand and to remember. Using the C and D scales of an ordinary slide rule, it is necessary to note the number of times an operation is made, which results in the slide protruding to the left. In this position one records +1 for a multiplication and −1 for a division. The algebraical sum is then added to the algebraical sum of the logarithmic characteristics of the factors of the fraction. The result is the characteristic of the logarithm of the answer, which readily indicates the position of the decimal point.

This is, of course, very similar to the "digit" system, but in practice I find it much more convenient and less confusing, especially in cases where some of the factors are less than unity.

To assist the memory—though after a few minutes' practice it will, I think, be found hardly necessary—the slide rule should be marked M+1, D−1, denoting for multiplication add 1 and for division subtract 1, near the beginning of the D scale.

It is hardly necessary to give an example, but I think a few trials would convince many people of its practicability. It might be of interest to record that, in a speed test, I was able to give correct answers before another person was able to work out even his approximations.

Brussels, *February 10th.* A. E. ROBINSON.

Cable Charging

In Mr. F. G. W. Tree's article on "Cable Charging" in the issue of February 10th there appear certain statements which seem to differ from the generally accepted theory of dielectric losses.

The following sentences appear in the article:—"At this point, with an alternating voltage impressed on dielectrics of finite conductivity, the charging current does not lead the applied voltage by exactly 90 degrees; there is a minute current component representing the current passing through the dielectrics, and also the dielectric losses due to the alternating field, which are larger at high temperatures where resinous impregnated dielectrics are used." "The alternating energy current, and the resistance calculated from it, represent the results of a true ohmic effect. They are independent of frequency, and are often misunderstood as being the result of hysteresis."

Since Mr. Tree appears to accept the theory of alternating-current losses being due, in part, to absorption in the dielectric and not to hysteresis, his statement that they are due to the alternating electrostatic field seems to be rather contradictory. Further, the true dielectric conduction current certainly increases with temperature, but I believe that it has been fairly well established that losses due to absorption decrease with increase of temperature in the case of resinous impregnated dielectrics. Mr. Tree's last quoted statement that the losses are independent of frequency is certainly not substantiated in theory and practice.

Portsmouth, *February 11th.* C. R. FIELDER.

Advice to Demonstrators

Nothing looks easier than giving a nice interesting demonstration where the speaker holds the attention of the audience for an hour or so, unless it is in the giving of an after-dinner speech where everyone feels that the speaker has said just what any of his hearers was feeling and would have said.

These reflections came to mind after hearing some E.D.A. public-speaking lady competitors going through their trials with a view to selection for the London trial. All of them were somewhat nervous, although they were doing work which they had done before, but there is no harm in a little nervousness. The speaker who is too cold may easily fail to warm up the audience, and many of our most famous orators are terribly nervous until they get into the swing of their speeches. One demmer (short for demonstrator) whose matter was good and whose poise was excellent, talked to those just in front of her in a pleasant conversational tone and forgot those behind; a little louder and she might have been first in the competition. Always talk to the back rows may be trite, but it is good advice, and is often forgotten.

Some gave their addresses as if they were giving a lesson in school; this fault is difficult to describe but it is very real. The good demonstrator will make each hearer feel that she (or he) is getting personal attention and is listening to a friend. The art is not acquired in five minutes; it requires genuine sympathy, and it is no use trying to acquire it if you despise your audience. One of the competitors, who spoke on electric cooking, gave a large amount of time to describing other types, including oil stoves on Atlantic liners, and finished by declaring that while electric cooking was not perfect it was being rapidly improved! Another quoted a good deal of poetry which does not go down with an English audience, which is afraid of anyone who talks in an improving fashion; even humour must be used very sparingly.

One demonstrator, who spoke of medical electricity, finished by saying that when used without precautions X-rays often had fatal results, not a good grand finale to her discourse. Some were very short and left the impression that they had not much to say; the good demmer will talk for a quarter of an hour and leave the impression that she has only spoken for five minutes, but that needs much careful practice. One is reminded of the preacher who told one of his Majesty's judges that he hoped he had not been too long, to which the learned judge replied "Not long, but tedious."

The speeches were carefully prepared and all speakers can make good by further preparation. It seems difficult to imagine that to make a plain statement of ordinary facts in an interesting manner should take years of training, but that is what is behind successful public speaking. The one who has got to this has passed beyond the amateur into the professional stage and that is what E.D.A. is striving for in organising this competition. Studying one's faults is a disgruntling business, but if done properly for the purpose of getting rid of them it may become as interesting as studying golf strokes. There is every chance of achieving great success as a demmer if one can appreciate the criticism of a

February 9th. CANDID FRIEND.

Engineering Apprenticeship

I am contemplating entering a son in the electrical engineering business and wish to obtain practical and reliable information as to the best course for a man of moderate means to pursue.

As far as I can see at present, the manufacturing side of the industry is of the greatest interest, but I have formed no final opinion on this point. From the meagre information available, it appears that a course at a university college is desirable before a works course is undertaken. The ultimate point is this: which method of apprenticeship is likely to be the most satisfactory and economical having regard to results, and the time occupied in obtaining those results (1) a concurrent works and study course, or (2) a university or equivalent course succeeded by a works course, provided that the student could live at home during his university or equivalent training?

A three years' course at a university is, of course, somewhat expensive in the absence of a scholarship, and I should be interested to know whether it is possible to obtain similar training outside the university with equivalent results but at a reduced cost.

I am given to understand that after graduating at a university, the rate of remuneration during the subsequent works course is reasonable and in the neighbourhood of 40s. per week. In addition I am informed that a university graduate is much better placed in the industry than an apprentice who enters the works at once and graduates externally. Finally, is it necessary to arrange for a post-university works apprenticeship in the early stages of, or prior to, the university course? Perhaps your readers could enlighten me on these points. Any information would be most gratefully received.

Teddington, *February 11th.* PATER.

Peaks and Charges

Mr. H. Wilson's letter in your issue of 10th inst. raises a most important and interesting problem which must be seriously exercising the minds of supply engineers, particularly if they are taking, or are about to take, a bulk supply from the Central Board or other authority. Hitherto many supply engineers appear to have regarded the domestic load as an off-peak load which can be supplied at a price little more than the cost of generation (excluding capital charges) or the kWh charge of a bulk supply.

But with the increase in the domestic load, that load will soon constitute the system peak and as such must be charged with its proper proportion not only of the kW demand charge but also of distribution capital charges. Even now a proportion of the domestic (*i.e.*, the cooking and heating) load falls

on the system peak, dependent upon the diversity between that load and the system peak. There appear to be no reliable figures for such diversity in this country, but an article in the *Electrical World* gave the results of tests carried out in America, from which it would seem that for not less than twenty cookers connected to one transformer the diversity factor on that transformer was five.

It is evident, therefore, that even now the domestic load must be charged with its proper proportion of peak load charges, unless it is to be subsidised by power and lighting consumers, and, under the conditions envisaged by Mr. Wilson, it must also carry the charges due to the difference between the system peak and the industrial or lighting peak whichever is the greater; present day prices should have regard for this.

With regard to the water company, this supply should in my view be unrestricted as it is impossible to forecast over a period of years at what hour the system peak will occur. The cost of generation with Diesel engines appears extremely low, especially if regard has been had for capital charges on a standby plant which is essential for a waterworks, and indicates that the load factor must be extremely high, in the neighbourhood of 90 per cent., which is usual with waterworks supplies. For this load factor the cost of bulk supply (taken as £3 per kW plus 0.25d. per kWh) would work out at 0.34d. per kWh or, say, 0.357d. per kWh for 5 per cent. loss in distribution (for a h.v. supply).

If, therefore, the works are situated near to the bulk supply point (distribution capital charges thus being small) it may be possible to give this supply, unrestricted, at 0.4d. per kWh. I was recently instrumental in securing a waterworks load amounting to some 270 kW with a load factor of 80 to 85 per cent. at a price of 0.5d. per kWh, which was the ascertained cost of similar waterworks operated by the same company and having their own generating plant.

Highgate, *February 10th*. J. N. R. PERKS.

Mr. Wilson has discovered that his maximum demand is shifting from the evening to the morning. In the same issue that Mr. Wilson's letter appears Mr. McKenzie is reported to be expecting his maximum demand to occur on Sunday mornings.

With over fifty per cent. of the consumers now cooking by electricity, I have for the past three years been experiencing a maximum load almost every day between the hours of noon and 1 p.m., a feature I have frequently commented on in the electrical Press.

The highest demand recorded on my undertaking at midday this winter is 2,350 kW, compared with a maximum evening demand of 1,652 between 4.30 and 5 p.m.

Under a two-part tariff at the rates now being offered by the Central Electricity Board electric cooking will not only be retarded, as Mr. McKenzie anticipates, but is more likely to become definitely prohibitive; it is my opinion that the solution is the introduction of a three-part tariff, for, as Mr. Blake recently pointed out, seventy-five per cent. of the standing charges are quite independent of the maximum demand.

Apply the service charge to the first as well as to the second and later connections and the kW charge can then be reduced to a figure which will not retard development.

I am in agreement with Mr. Wilson when he says he would like to hear what other engineers have to say about it.

Welwyn Garden City, *February 13th*. A. T. BULLEN.

Training Electrical Engineers

With reference to Mr. J. V. Brittain's interesting article upon this subject in the ELECTRICAL REVIEW of February 3rd, I should like to indicate one or two further conditions in which students are required to satisfy the assessors before being eligible to sit for National Certificates in Electrical Engineering.

The first is to obtain 60 per cent. of the possible attendances in each subject in each year, and with this condition students periodically working overtime may not comply. In addition, the class examinations must be passed in all five years, with a minimum of 40 per cent. of marks. The percentage for homework and laboratory work is also 40. It will be seen that the essential difference between the national examination and the graduateship examination of the appropriate professional institutions is that in the former, a systematic course of study extending over at least five years is essential as well as the passing of the final examinations. Candidates failing to gain the necessary minimum marks for attendance, homework, laboratory work, and class examinations in any subject will be disqualified for the national examination until the classes have been successfully repeated.

The time allowed for the completion of the Higher National course of two years will, in some instances, prove inadequate with only evening study. An extra year is sometimes recommended depending upon the subjects chosen by the candidate. Although there are many conditions to be fulfilled, the percentage of examination marks for a pass appears to be very low, and during the year many thousands of students from all the recognised technical colleges throughout the country obtain these certificates.

It is possible, therefore, that these awards are becoming too common, and not regarded by employers as a sound proof of technical ability. To increase the worth of the certificates would it be practicable to increase the minimum percentage marks from 40 to, say, 55, or, alternatively, to have a national external examining body to set and mark the papers in a similar manner to London University degrees?

I would like to know the percentage of students who, after obtaining the two National Certificates and the I.E.E. English examination do actually enter the Institution of Electrical Engineers. I should think that the majority finish at the final National, whereas young engineers studying specifically for the graduateship examination either are students of the Institution or become corporate members afterwards. The drawback to many may be the period in a responsible position that is required for associate membership.

Walsall, *February 7th*. A. M. SPRUCE.

Living Conditions in India

I have seen the letter from " Enquirer " in your issue of January 13th.

I spent eight years in the Provinces of Bihar and Bengal, including the war years. As regards present day money values I am, of course, in no position to speak; I suppose, that in India, like everywhere else, money will not buy as much to-day as it would twenty years ago. In other ways, conditions have probably not changed much since 1919.

It is very dangerous to predict or prophesy, but I have every faith in the good sense of the Indian peoples as a whole, and their ability to overcome the present political upheaval. The opportunities for trade are undoubtedly there, also the money to trade with.

If " Enquirer " is adaptable, and young for his years, he might " make out " very successfully, but I should say that there is some risk in a man of his age going to settle in a country where everything is so different from anything to which he has been accustomed. If he is a married man he probably has children under ten years old; these will have to be left in England (that is the reason why I gave up a good position in India).

If " Enquirer " should decide to go out he would want to conduct his own business in all its branches himself, not only sit in an office and trust to assistants familiar with the country and its ways to make all the connections with his commercial prospects. This means that he must be prepared to learn the ways of the country and the ways of the people as a beginner, and he may find it difficult.

These are just a couple of thoughts put forward by one who took very kindly to India, its people, and its ways, except for the family difficulty referred to above. There are many men to whom this family question presents no worry, and there are a few who really seem to prefer the " freedom " which such an arrangement gives; it is one of the things which each man has to decide for himself.

If one has eyes to see and ears to hear, India is very alluring, but to the matter-of-fact and unimaginative, it can be no more interesting than the East India Dock Road.

Drummondville, Canada, *February 1st*. C. E. OLIVE, *Chief Engineer*, Canadian Celanese, Ltd.

Protection from Shock

Recent references to fatalities due to electric shock stress the importance of adequate protection. Earthing is officially recognised as a means of protection but the earth connection must be more than merely a conscience-satisfying one; that is, the earth circuit must have a low resistance and sufficient current-carrying capacity to avoid the setting up of dangerous potentials, and to allow for operation of the protective gear.

It must be admitted, however, that earthing may sometimes add to danger rather than prevent it. In such cases, or where a good earth is hard to find (as it very frequently is), a sure method of overcoming the problem is to install automatic protective switchgear. Broadly speaking, this apparatus consists of a combined switch and tripping mechanism operated by a relay, the latter being connected in the earth circuit. As the relay operating current is usually of the order of 10 to 15 mA at a very low voltage, isolation is effected without the possibility of a dangerous potential appearing. On occasion one meets with these switches, produced abroad, and it seems rather mysterious why they are not more widely adopted, especially for domestic purposes.

Is it due to lack of enterprise on the part of the ostensibly potential British manufacturers? As so little is heard of these switches I should be glad to hear from your readers whether artificial earthing presents difficulties not apparent at first sight.

London, W.4, *February 13th*. S. H. PARSONAGE.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The Grid and Revival

Mr. Hugh Quigley addressed the British Works Management Association at Birmingham on February 9th on "The Management of the Future," indicating what he considered to be the true task of the higher management in industry, which he suggested should have four special objects. First, it must control production and productive capacity in order to avoid the worst incidences of boom and slump. Secondly, it must avoid economic waste, waste of capital and waste of design and material. It must preserve some balance between consumption and capital goods and between durable and non-durable goods, within both categories. Also, it must cause some proper distribution of industrial activity, as between one area and another, in order to avoid the accumulation of masses of production in districts which the processes of time and economic change might render derelict. Pointing out some of the weaknesses of the intense localisation of industrial activity, Mr. Quigley said that if proper foresight had been exercised the frantic accumulation of factories in the London area, which was already constituting a grave problem, would never have taken place. The management of industry, which should be interested in all industries and not only in one, should take steps to prevent mass production methods in unsuitable localities. The speaker wondered whether the future might not show movement away from the intense localisation of industries and a drift of population back to rural districts. The development of the grid system, the acceleration and widening of transport facilities, and the concentration of attention on regional planning, were all factors making for the revival of rural districts.

Electric Lighting Fittings for Canada

The Department of Overseas Trade has received an inquiry from a firm in Victoria, B.C., which desires to be placed in touch with United Kingdom manufacturers of fancy electric lighting fittings, such as brackets, floor or bridge lamps and lamp shades. The fittings are to be supplied unassembled for finishing locally. Firms desirous of offering goods of United Kingdom manufacture can obtain further details of this inquiry upon application to the Department, 35, Old Queen Street, S.W.1. Reference number G.X 12268 should be quoted.

Modern Applications of Electricity

Messrs. Crompton Parkinson, Ltd., have sent a new publication in photogravure entitled "24 hours with Crompton Parkinson." It shows pictorially how electricity is used in modern production (*e.g.*, the morning paper, bread, motor car, &c.).

An Electrical Club for Leicester

A meeting took place at the Bell Hotel, Leicester, on February 9th for the purpose of considering the desirability of forming an electrical club in Leicester. About fifty people, comprising representatives of the supply, manufacturing, and electrical installation sections of the industry, attended. The chair was taken by Mr. J. Orringe, and a resolution was unanimously carried that an electrical club be formed in Leicester on and from February 9th, 1933. The officers elected to serve for the ensuing twelve months are: President, Mr. J. Mould; chairman, Mr. J. Orringe; treasurer, Mr. E. J. Riley; secretary, Mr. H. Foster; assistant secretary, Mr. W. N. Coulson. The following have been elected members of the committee:—Supply side: Messrs. O. M. White, Rodgers, and Ginno. Manufacturing side: Messrs. A. Markwick, P. G. Hackett, and A. Baillie. Installation: Messrs. W. G. M. Robinson, F. J. Smith, and F. L. Witcomb. It was decided to leave the name of the club in the hands of the Committee to decide.

Street Lighting Improvements in Derby

In Derby an increase of 93 kW in public lights was made last year. The centre of the town and all main bus routes are electrically illuminated, including danger, warning and direction signs. Some 10¼ miles are controlled by fifty-seven relay switches linked together and operated simultaneously by a master time switch at the electricity works. Secondary branch roads and illuminated signs are linked to the bus routes, and underground links are installed which permit a fault to be isolated without failure of the lighting system, and facilitate independent testing operations. The 450 lighting units with a load of 120 kW are to be augmented by units serving the remainder of the main roads to the borough boundary.

Centrally mounted open-type refractor units have been adopted where possible, advantage being taken of existing tramway standards at approximately 40 yd. spacing. 1,000- and 500-W fittings are mounted 24 ft. high and 300- and 200-W fittings 21 ft. high. The distribution of light provides a diversity in the maximum and minimum intensities of no more than 10 to 1. An example in Midland Road gives a maximum intensity of 1.5 ft.-candles, and a minimum of 0.16 ft.-candles at road level with 300-W lamps.

Two views of the new "Revo" street lighting at Derby

The borough electrical engineer, Mr. F. Nicholls, has also equipped attractive architectural features of the town (such as the Florence Nightingale Memorial) with floodlights. The relay switching system is the product of Brookhirst Switchgear, Ltd., and the street lighting fittings are by the Revo Electric Co. The Macintosh Cable Co.'s "Maconite" insulated cables are used for all span work.

Britain's Overseas Electrical Trade

During January electrical exports totalled £722,743, as compared with £882,964 in December and £708,341 in January, 1932. Electrical machinery imports amounted to only £151,498, which is £184,305 lower than the preceding month's figure and £113,529 below that for the corresponding month of last year. At £192,764 electrical imports show decreases of £95,850 and £105,728, as compared with December and January last year. Our usual monthly table giving an analysis of the January electrical trade figures will appear in our next issue.

Anglo-Palestine Exhibition

This exhibition is to be held at the Royal Agricultural Hall, London, from June 7th to 17th. It is hoped that it will assist the development of British trade in the East and inter-trading between this country and Palestine.

The Lockerbie Exhibition

In connection with the inauguration of the Dumfriesshire electricity scheme an exhibition was held in the Town Hall, Lockerbie. The exhibitors were: British National Electrics, Ltd.; Simplex Electric Co., Ltd.; Edison Swan Electric Co., Ltd.; General Electric Co., Ltd.; Curron Company, Ltd.;

English Electric Co., Ltd.; Jackson Electric Stove Co., Ltd.; Ferranti, Ltd.; and Callender's Cable and Construction Co., Ltd.

E.D.A. Public Speaking Competition

In the North-West Area Competition of the E.D.A. Public Speaking Campaign the number of entries is ten women and thirty-three men. Five eliminating competitions have been held, three in Manchester and two in Liverpool, and further heats are to be held. The best two ladies and best four men will be selected to compete in the Area final, which will be held on February 28th at the Midland Hotel, Manchester, immediately before the North-West Area annual luncheon. The Lord Mayor of Manchester (Alderman Wm. Walker, M.I.E.E.) is to act as one of the judges.

Middlesbrough Ball

The third annual ball arranged under the auspices of the Tees-side E.T.B.I. Committee will be held at the Town Hall, Middlesbrough, on Friday, February 24th. Mr. R. H. Scotson, borough electrical engineer, is chairman of the Committee, with Mr. G. D. W. Middleton as hon. secretary and Mr. A. T. Griffith, of the General Electric Co., Ltd., as hon. treasurer. Some 500 guests are expected to be present.

The Midland Ball

The Committee of the Midland Electrical Engineers' Ball, 1932, is handing over a donation of fifty guineas to the Institution of Electrical Engineers' Benevolent Fund.

Irish Free State Electrical Imports

A very quiet tone continues to prevail in the electrical trade in the Irish Free State, the imports of electrical machinery, fittings, and apparatus during December last having attained a value of £60,193 as compared with £75,131 in the similar month of 1931. The appended table gives the imports during the past two years :—

	1932.	1931.
Electric machinery	£174,036	£181,464
Electric wires and cables	99,528	99,584
Wireless sets and parts	136,894	132,275
Electric lamps and parts	52,997	59,682
Other electrical goods	163,748	202,052
Copper wire	10,274	17,167
Totals	£637,477	£692,224

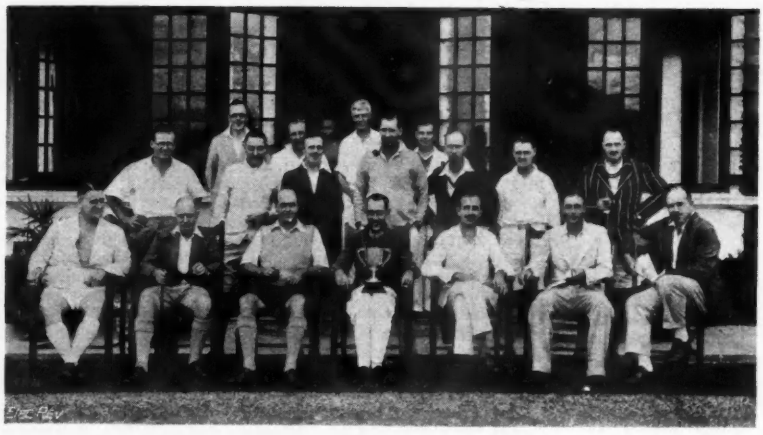
It will be noticed that the decrease extends to every item of the table except radio apparatus, the slight increase shown being due to the rise that took place before the imposition of the import duty.

Electrical Imports Into Poland

The *Board of Trade Journal* states that imports of "conductors, apparatus and other electrical materials" into Poland during December reached a total of 2,638,000 zloty.

"Jus' Splendid!"

In a South Africa and Empire Shopping Supplement to the *Cape Times* there is an effective electrical page headed "Use of Electricity in Cape Town Extending." The lower part of the page is occupied by a well-set-out advertisement of the municipal undertaking depicting a native cook with a broad satisfied smile expressing her opinion of electric cooking in bold type stretching right across the page: "Ach! Missis—dis Electri Cooking is jus' Splendid!"



F.M.S. competitors for an electrical golf cup

Left to right: (back row) Messrs. W. A. Taylor, W. C. Gee, F. Bolton and H. Miles. (Middle row) Messrs. E. Dunn, R. E. Roberts, G. R. Lewis, R. W. Hunter, H. R. Sparrow, P. A. Bray and T. E. R. Morphy. (Front row) Messrs. W. R. Dowse, A. W. Every, W. J. Williams, J. G. Clemetson, V. Winson, R. C. Giggins and A. H. Carson

New Chesterfield Showrooms

The Chesterfield Corporation Electricity Committee has accepted the offer of the Improvements Committee of a site in Holywell Street for the erection of an electricity showroom.

Derby Greyhound Racing Track

The total lighting load at the Derby greyhound racing track now nearing completion will be in the neighbourhood of 120 kW. The two stands will be illuminated by totally enclosed diffusing fittings of the "Silvaray" pattern, each with a 150-W Siemens gasfilled lamp. In all between 50 and 60 of these units are employed. The forecourts and terraces fronting the stand receive a good general illumination from elliptical reflectors of the "Benjamin" pattern, while for the track lighting arched "Davit" poles have been employed fitted with "Benjamin R.L.M." reflectors with 1,000- and 1,500-W lamps. The photograph on page 251 shows the efficiency and even lighting intensity of the scheme. All the main cables are paper insulated, lead covered, double steel tape armoured, and have been entrenched, while the distributing cables for stands and offices, &c., have been run in heavy gauge screwed welded conduit. These are of Siemens manufacture. A B.T.-H. loudspeaker equipment has been installed so that a public address system may be available for making announcements, &c. The front of the stands are festooned with strip lighting to create a decorative effect. The electrical installation work was carried out by Messrs. Taylor & Briggs, Derby, in co-operation with Mr. S. Backner, Manchester. The lighting scheme was planned by the Illuminating Engineering Department of Siemens Electric Lamps and Supplies, Ltd.

Ex-British Westinghouse Association

The fourteenth reunion dinner of the Ex-British Westinghouse Association will be held on March 17th at the Trocadero Restaurant, W., at 5.45 for 6.45 p.m.

Local Exhibition

An electrical exhibition was held last week by Messrs. J. D. Waller, Ltd., electrical contractors, at the Albion Hall, Earby. Well attended cooking demonstrations were held in the afternoons and evenings.

East Ham Showroom Proposal

East Ham Corporation Electricity Committee has decided to negotiate for the acquisition of premises at Manor Park for electricity showroom purposes.

Czechoslovakian Electrical Imports

Electrical machinery and tools imported into Czechoslovakia during 1932 amounted in value to 213,696,000 crowns, imports during December totalling 25,190,000 crowns.

Hungarian Foreign Trade

During December imports of electrical machinery and apparatus totalled 2,336,000 pengös in value, while exports amounted to 3,118,000 pengös.

The Russian Radio Industry

The Council of the People's Commissioners has appointed a special committee to control the wireless apparatus industry of Russia, including the setting up of a programme of production.

Social Events

Three years ago Mr. R. C. Giggins, who is the general manager in Malaya for the General Electric Co., Ltd., gave a golf cup to be competed for by Government engineers, both electrical and telephone, and direct representatives of electrical manufacturers or their agents. To illustrate the field covered, in 1929 the Cup was won by Mr. W. R. Dowse, of the Posts and Telegraphs Engineering Branch, in 1930 by Mr. P. A. Bray, of the Government power station, in 1931 by Mr. Waterfield, a manufacturers' agent, and last year by Mr. J. G. Clemetson, of the General Electric Co., Ltd. Last year's competitors are shown in the accompanying illustration, with Mr. Clemetson, the winner, holding the cup.

An allegation that the electrical industry was being hampered in some places because of the anxiety of local authorities to safeguard the profits of their gas undertakings was made by Ald. John Bell, chairman of the West Midlands Joint Electricity Authority, and of the West Bromwich Electricity Committee, speaking at the annual dinner of the Midland Electric Corporation and West Midland Joint Electricity Authority Electrical Development Association Circles, at Wolverhampton, on February 7th. He stressed the necessity for publicity. They were up against a lack of funds, however, while the gas industry seemed to have ample to spend on publicity. Mr. G. R. J. Parkinson, manager and chief engineer of the Midland Electric Corporation for Power Distribution, Ltd., spoke of the work done by the E.D.A. circles in promoting harmony between the electrical supply authorities, contractors, and manufacturers. They now worked together for the interest of the electrical industry, and not merely for their own individual interests, as they had done a few years ago. Mr. E. J. Jennings, secretary of the Birmingham Corporation Electricity Department, urged that now was the time for wise spending, and spoke of the tremendous field for development of sales of electricity supply that lay in assisted wiring schemes. While there were 4,000,000 wired

houses in the country, the connected load only averaged 400 watts per home, and there must be at least another 3,000,000 homes waiting to be wired. In the last three years alone 114,000 houses had been wired under assisted wiring schemes. Others who spoke were Mr. E. F. Hetherington, chief engineer and manager of the West Midlands Joint Electricity Authority, Major Sir Charles A. Mandor, Mayor of Wolverhampton, and a director of the Rees Roturbo Manufacturing Co., and Mr. C. Heathcock, secretary of the Midland Electric Corporation.

The Mount Everest Expedition

The main point from which the Mount Everest climbing expedition will communicate with the outside world is at Darjeeling, 8,000 ft. up. For the transmitting and receiving apparatus, Siemens Electric Lamps and Supplies, Ltd., have provided a 200-V h.t. battery with an output of 25 mA in "Super Radio Full o' Power" square V.6 50-V units, and for balancing in the transmission apparatus standard H2 0.5-mA batteries.

For the base camp, 16,000 ft. up, at the foot of the Rongbuk Glacier, three V6 batteries have been supplied with a maximum weight of 40 lb. gross (150 V 15 mA, 200 V 20 mA, and 150 V 30 mA), in 50-V units. At the head of the Rongbuk Glacier (21,000 ft.) the temperature may be −24 deg. F., and an installation is required for reporting to the base camp. The weight permissible per package is limited to 30 lb. The l.t. filament circuits require 0.6 A at 2 V for which inert cells, which need not be energised until the installation is set up, will be used. The 150-V 30-mA h.t. batteries are of the V.5 "Power" type in round 45-V units. For grid bias 9-V G2 batteries have been provided. Small inert cells to Air Ministry specification have also been supplied to the Westland Aircraft Works for the Houston-Mount Everest flight.

Recent Contracts

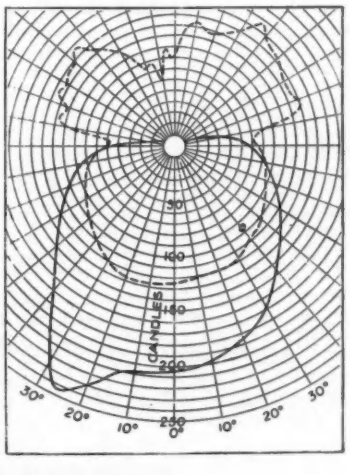
Britannia Batteries, Ltd., have secured a repeat order from Leyton Borough Council for two nickel iron alkaline batteries, each of 60 "A1-10" cells of 375 Ah, for refuse collecting vehicles. A repeat order has also been received from the Islington Borough Council for six tubular lead batteries for the same purpose.

The Sturtevant Engineering Co., Ltd., has recently received an order for the supply of two electrostatic precipitation plants for the removal of dust from gases, the volume handled totalling 14,500,000 cu. ft. per hour.

The Cambridge Instrument Co., Ltd., has recently received orders for temperature and pressure recording instruments from the Assam Oil Co. and the Burmah Oil Co. through Messrs. Foster Wheeler, Ltd. The instruments, which are for measuring the temperatures and pressures in oil stills, superheaters, &c., comprise six two-point and two single-point recording potentiometers of the latest "Cambridge" design, fitted with continuous charts, operated by motors arranged to work on a main d.c. supply of 110 V and six two-point pressure recorders.

A British Reflector Lamp

The accompanying candle-power distribution curves are reproduced from a N.P.L. report on lamps made by the Boula Reflector Lamp Co., 156, Charing Cross Road, W.C.2. The broken lines relate to an untreated lamp, and the full lines to a lamp that has been silvered by the company's patent process. The silver mirror is normally deposited on the top hemisphere of the bulb, but it can be applied wherever required; it is protected externally by a copper deposit. It is claimed that the mirrored coating will not blister or rub off and is fully heat and weather resisting. The "Boula" lamp can be supplied in either of the gasfilled or vacuum type, or in the form of striplite. The price is 1s. above the standard list prices.



Trade Announcements

Lektro-Linx, Ltd., announces that it has moved from Vauxhall Bridge Road to new offices at 79, Rochester Row, S.W.1. The telephone number remains the same—Victoria 3541.

Messrs. McLeod & McLeod have recently established new factory premises in London for the manufacture of a wide range of electrical and radio parts and components. The installation of plant and equipment is now being carried out.

Ericsson Employés' Hospital Fund

The thirty-third annual meeting of the Ericsson Employés' Hospital Fund was held on February 7th, Mr. J. Engblom presiding. Grants totalling £451 were made to various institutions and the fund for the endowment of a second bed has now reached a total of £164.

For Sale

Poplar Electricity Department has redundant electric cookers for sale.

Rawtenstall Corporation Electricity Department has electrical plant for disposal.

Brighton Corporation has alternators for disposal.

(See our classified advertisements.)

"Full o' Power" batteries for the Mount Everest Expedition

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price Feb. 15th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash, Chlorate ... ... per lb.	3½d. to 4½d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£3	—
a Sulphur Commercial... ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ... ,,	1/2 to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£141	£2 inc.
Grade II ... ... ,,	£99	—
Grade III ... ... ,,	£53	—
c Brass (rolled metal 2" to 12" basis) per lb.	6¼d.	¼d. dec.
c ,, Tubes (solid drawn) ... ... ,,	8¼d. to 9d.	—
c ,, Wire, basis ... ... ,,	7¼d.	¼d. dec.
c Copper Tubes (solid drawn)... ... ,,	9¼d.	—
g ,, Bars (best selected)... ... per ton	£61	—
g ,, Sheet ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£36 5s.	—
d ,, ,, Sheets ... ,,	£64	—
d ,, ,, Wire Rods ... ,,	£41 15s.	15s. inc.
d ,, ,, H.C. Wire ... per lb.	6¾d.	¼d. inc.
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
m German Silver Wire ... ... ,,	2/2	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	4¼d.	¼d. dec.
i Iron, Pig (Cleveland No. 3)... ... per ton	62/6	—
i ,, Wire, galv. No. 1, P.O. qual. ,,	£20	—
g Lead, English pig ... ... ,,	£11 15s.	5s. dec.
g Mercury ... ... per bot.	£9 12s. 6d. to £10 7s. 6d.	5s. dec.
Mica (in original cases) small ... per lb.	6d. to 3/6	—
,, ,, medium ... ,,	4/- to 8/-	—
,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1d.	—
p ,, ,, drawn bars & rods ,,	10¼d.	—
p ,, ,, rolled strip & sheet ,,	10¼d.	—
p ,, ,, wire ... ... ,,	11¼d.	—
o Platinum ... ... per oz.	£7	10s. dec.
d Silicum Bronze Wire... ... ... per lb.	7¼d.	¼d. inc.
r Steel, magnet, in bars ... ... ,,	7¾d.	—
g Tin, Block (English)... ... ... per ton	£149 15s. to £151 10s.	15s. inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	2s. 11d.	2d dec.

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
m P. Orniston & Sons.
o Johnson, Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

Messrs. James Forster & Co. report that in the lead market fair business has been transacted this week with home consumers, but otherwise there is nothing of interest to report. The market keeps remarkably steady, which rather leads to the anticipation that should any favourable factor arise in the political situation, prices would quickly respond.

Catalogues Required

Messrs. L. Wilkinson, electrical wholesalers, 8, City Road, Finsbury Square, E.C.1, wish to get in touch with British manufacturers of switchgear and electrical accessories, and ask for catalogues, lists, &c.

Catalogues and Lists

David Brown & Sons (Huddersfield) Ltd., Park Works, Lockwood, Huddersfield.—An illustrated brochure on "The Installation and Maintenance of Speed Reducing Gears."

Edison Swan Electric Co., Ltd., 123-5, Queen Victoria Street, E.C.4.—Two illustrated booklets dealing respectively with "Ediswan" dry-charged starter batteries and a prepayment meter fire.

Everett, Edgcumbe & Co., Ltd., 117, Victoria Street, S.W.1.—Leaflet No. 437, giving details of a new road coach speedometer.

Philips Industrial, 145, Charing Cross Road, London.—Publication No. 407, dealing with the new "Philivox" power gramophone, and leaflet No. 276x, giving particulars of a new sodium lamp for laboratory use.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.—Leaflets Nos. A.G.6436 and 6440, describing, respectively, the new portable cleaner and groomer, and the "Sashalite" photo flash bulbs. Also an illustrated folder (No. F.5645) of new British-made totally enclosed lighting fittings.

B.E.N. Patents, Ltd., 92, Tottenham Court Road, W.1.—Leaflet describing a new portable petrol-electric generator unit.

Hart Accumulator Co., Ltd., Stratford, E.15.—A leaflet on storage batteries for house lighting.

Wingrove & Rogers, Ltd., 188-9, Strand, London.—A 16-page booklet giving details of the "Polar" radio condensers.

Metallic Seamless Tube Co., Ltd., Ludgate Hill, Birmingham.—An illustrated catalogue of steel conduit and fittings.

Reliance Telephone Co., Ltd., 12-13, Henrietta Street, London, W.C.2.—A brochure giving particulars of the company's automatic interconnecting telephones.

Falk, Stadelmann & Co., Ltd., 83-93, Farringdon Road, E.C.1.—Catalogue No. 675, dealing with conduit wiring systems and accessories.

Six-Sixty Radio Co., Ltd., 17-18, Rathbone Place, W.1.—A broadsheet advertising the new super-five all-mains a.c. receiver.

Aidas Electric, Ltd., Aidas Works, St. Leonard's Road, Willesden Junction, N.W.10.—A catalogue giving information regarding the "Sadia" automatic electric water heaters, and a leaflet dealing with a new immersion heating group.

John Harper & Co., Ltd., Albion Works, Willenhall, Staffs.—A booklet on the use of Harper castings.

Runbaken Magneto Co., Ltd., 280, Deansgate, Manchester.—A leaflet on "Quixol," a new metallic paste solder.

Westinghouse Brake & Saxby Signal Co., Ltd., 82, York Road, Kings Cross, N.1.—A folder describing the new "Westric" car battery charger.

Bankruptcy Proceedings

C. A. Whittington, electrician and wireless dealer, 400, Abbeydale Road, Sheffield.—The adjourned examination was held recently at the County Court Hall, Bank Street, Sheffield. According to the statement of affairs lodged the liabilities amounted to £865, and the assets were expected to realise £94. Debtor said that the day before the receiving order was made his father had removed goods worth about £50 to £60 from his shop, but he denied that he had offered wireless sets for sale indiscriminately. The Registrar observed that it was apparent that debtor had not disclosed all his transactions, and the examination was adjourned *sine die*.

C. Holdroyd, electrical engineer, 87, Buchanan Street, Blackpool, Lancs, lately 8, Cleveleys Avenue, Cleveleys.—The public examination was continued recently, at the Court House, South King Street, Blackpool, when the statement of affairs showed liabilities of £1,580, and a deficiency of £1,517. The debtor had previously stated that he was expecting to receive a substantial sum in respect of an invention with which he had helped. In reply to the Registrar, the debtor said that money had gone in paying certain debts and accounts, but the Registrar replied that, making allowances for the loss on the legal proceedings against the debtor, and the sheriff's expenses, there was still a large sum to be accounted for. The examination was adjourned.

G. W. Kempton (trading as "Radio Supplies"), radio dealer, Coronation Buildings, Victoria Road, Elland, Yorks.—The public examination was held on February 10th at the County Court, Prescott Street, Halifax, when the statement of affairs submitted disclosed a deficiency of £1,094. Debtor attributed his failure to insufficient capital and court charges. The examination was closed.

H. E. Hewitt, electrical engineer, 55, Park Road, Hornsey, N.—Receiving order made February 8th on debtor's own petition.

A. Peat, electrical engineer, White Hart Street, Mansfield.—Public examination March 2nd at the County Court House, Nottingham.

J. K. Gardner, electrical engineer, 52, Bell Street, Henley-on-Thames.—First and final dividend of 2s. 2½d. in the £, payable February 17th, at the Official Receiver's office, 8, Forbury, Reading.

Company Liquidation

X-Rays, Ltd., 47, Red Lion Street, E.C.—The statutory first meetings of the creditors and shareholders were held on February 8th at the Board of Trade Offices, Carey Street, W.C., before Mr. J. Barwick Thompson, Senior Assistant Official Receiver. The compulsory winding-up order was made on the petition of Messrs. Schall & Son, Ltd., manufacturers of X-ray apparatus, creditors for £106. A statement of affairs was submitted showing total liabilities of £23,866, assets of £12,163, and a deficiency of £15,256 with regard to contributories. The chairman reported that the company suffered a loss on the trading in its earlier years, and in March, 1927, with the consent of the Court, the £75,000 nominal capital was reduced to £24,265 and the issued capital became £3,554. Funds were raised on the security of debentures, and on July 30th, 1932, Mr. W. L. Threlford was appointed receiver on behalf of the bondholders, whose claims amounted to £16,413. The assets would be entirely absorbed by those claims, and therefore there would be no possibility of any return being made to the unsecured creditors (£7,383) or the shareholders. The company's failure was attributed to the reduced spending power of hospitals and other institutions to which most of the company's products were sold; also to the fact that the Irish hospitals and institutions did not purchase so much of their X-ray apparatus from this country as hitherto. The deficiency of £15,256 was almost wholly in respect of depreciation in the value of stocks caused by the constant improvement in make and design by reason of which stocks became rapidly obsolete. The liquidation was left in the hands of the Official Receiver.

Private Arrangement

Arthur Smith (Radio), Ltd., Hazel Works, 56, Hazel Road, Kensal Rise.—The creditors were called together recently, when it was stated that the liabilities amounted to £741 and the assets totalled £284. After discussing the position, the opinion was expressed that the company should pass the necessary resolutions for voluntary liquidation. The creditors include: Dubilier Condenser Co., Ltd., £125; Marconiphone, Ltd., £75; and V. A. Padley, £52.

Dissolution of Partnership

Empire Radio and Electrical Stores, radio and electrical factors, 118, Portobello Road, North Kensington, S.W.—Messrs. J. Osborne and E. R. Bridges have dissolved partnership. Mr. Osborne will attend to debts and carry on the business.

Electricity Supply

Lighting, Domestic, Power

Accrington.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at an estimated cost of £869.

Ashton.—ASSISTED WIRING SCHEME.—The Town Council has approved an assisted wiring scheme submitted by the Electricity Committee. Every installation will be fitted with lamps, shades, and one electric iron. The cost of the installation will be one penny per point per week over a period of ten years, and service cables over private ground will be laid free of charge up to a distance of 30 feet. About twenty local electrical contractors attended a joint meeting with the sub-committee, and reached agreement over the terms. Prepayment meters will be installed in all houses having up to six points, but for more than that number payment will be made by quarterly accounts.

Barrow-in-Furness.—LOANS.—The Electricity Committee has received sanction to a loan of £2,000 in connection with a supply of electricity to Crake Valley and is applying for permission to borrow a further £2,460 for a supply to Swarthmoor, Pennington, Scales, etc.

Bedford.—The Electricity Committee is to apply for sanction to a loan of £55,000 for electrical appliances and equipment for hire.

Birkenhead.—ASSISTED WIRING.—There have been discussions between the Birkenhead Gas and Electricity Committees with reference to the development of the electricity undertaking, and especially to the conditions of the assisted wiring scheme. A decrease is recorded in the number of houses wired under the assisted wiring scheme from 1,772 in September to 137 in January. There are about 3,000 applicants for the scheme, and to carry it through borrowing powers for over £15,000 are now being sought.

Birmingham.—GRIT NUISANCE.—A recommendation is to be made to the City Council to spend a large sum of money on the provision of chimneys and special equipment for arresting the emission of the grit.

Bolton.—LOAN SANCTIONED.—The Electricity Committee has obtained permission to borrow £10,831 for the provision and equipment of three-phase sub-stations.

Brampton (Cumberland).—STREET LIGHTING.—The question of whether electricity or gas should be used for street lighting was discussed at a recent meeting of the Urban District Council, and it was decided that the clerk should communicate again with the Carlisle Electricity Department to ask for estimates of the cost.

Carlisle.—C.E.B. SCHEME.—The Electricity Committee has approved an application from the Central Electricity Board for a supply of electricity to the grid for experimental purposes, prior to the eventual taking over of the station by the Board.

Chesterfield.—SUB-STATION.—The Electricity Committee is to erect a central sub-station to deal with the heavy loads in the Holywell Street area.

Clacton-on-Sea.—FRINGE ORDERS.—Subject to a Fringe Order being granted, the Urban District Council has decided to give a supply of electricity at a cost of £1,000 to Jaywick Lane, St. Osyth, which is in the area of supply of the Colchester City Council.

Coatbridge.—PURCHASE OF UNDERTAKING.—The Town Council has decided to purchase the Coatbridge and Airdrie Electricity Supply Co.'s undertaking, so far as its operations are limited to the borough of Coatbridge.

Colchester.—REORGANISATION OF ELECTRICITY COMMITTEE.—The Town Council has adopted a scheme proposed by the Electricity Committee for the reorganisation of the Department, necessary owing to the growth of the undertaking in the past five years, and the extension of the area of supply. It is recommended that the districts which at present have no well-defined boundaries should be reconstituted, and that branch offices should be established in each district. The names of the managers to be in charge of these new branch offices are given in our "Personal" columns this week. The Corporation now has a supply area extending over 260 square miles.

Dorchester.—SUPPLY EXTENSIONS.—The Wessex Electricity Co. has informed the Rural District Council of its application to the Minister of Transport for consent to erect overhead lines from Steepleton to Yeovil, a branch line being supplied to serve the village of Maiden Newton.

Droxford.—PETITION FOR ELECTRICITY.—Tenants of Council houses at Bishop's Waltham have petitioned the Rural District Council for a supply of electricity, for which they would pay 6d. per week extra rental until the cost was met. The matter has been referred to the Housing Committee.

Durham.—SCHOOL LIGHTING.—The Board of Education has notified the County Education Committee that it is unable to sanction the expenditure in connection with the installation of electric lighting in the Barmston, Houghton-le-Spring, Tudhoe Colliery, Chilton Moor and West Auckland Council Schools.

Friern Barnet.—OPPOSITION TO BILL.—The General Purposes Committee has reported to the Urban District Council that the Gas Light and Coke Co. is endeavouring to include in its Bill a clause which proposes to restrict the powers of a housing authority to prescribe the form of heat, light, power or energy to be used in any building belonging to it within the limits of supply of the promoters. The Council has no statutory right to lodge an objection but the Committee recommends that the local member of Parliament be notified of the fact that the Council protests against the clause.

APPLICATION FOR PRICE REDUCTION.—The Committee has received correspondence from the Ratepayers' Association asking the Council to support its action in applying to the North Metropolitan Electric Power Supply Co., Ltd., for a reduction in the flat rate of charge for the supply of electricity. The Committee has recommended that the Association be asked to supply the Council with a copy of the company's reply when received, when the Committee will give the matter further consideration.

Guildford.—CHEAPER ELECTRICITY.—The Town Council has reduced charges for electricity as follows:—Lighting: town area, from 5d. to 4d. per kWh, from 3d. to 2½d., and from 2d. to 1½d.; rural area, from 6d. to 5½d. Power: Town area, from 1¾d. to 1½d., and 1¾d. to 1¼d.; rural area, from 2¼d. to 2d., and from 1¾d. to 1¼d. Cinemas: From 3d. to 2½d. and from 2d. to 1¾d. Heating: Town area, from 1d. to ¾d.; rural area, from 1¼d. to 1d. Industrial supplies: From 1¾d. to 1¼d., 1¼d. to 1¼d., and from 1¼d. to 1d. On the all-in rate there will be a reduction of approximately ten per cent., and on the kilowatt basis the standing charge is reduced from £15 per kWh to £13 10s., and the "unit" charge from ¾d. to ¾d. in the town area, and from 1¼d. to 1d. in the rural area.

Hastings.—ASSISTED WIRING.—The Electricity Committee proposes to apply for sanction to the borrowing of £10,000 for prospective expenditure on assisted wiring.

OVERHEAD LINE EXTENSIONS.—The extension of overhead lines at Beckley costing £537 is also recommended by the Committee.

Helensburgh.—CONDITIONS OF INSTALLATION IN HOUSES.—Following the receipt of a letter from the Clyde Valley Electrical Power Company regarding the installation of electric light in houses, the Town Council has agreed to allow installation on the following conditions:—That the Town Council signs no contract with the company; that the cost of fittings and wiring must be purchased outright by the tenant and no hire-purchase agreement entered into; and that before a tenant installs electric lighting he will enter into an agreement with the Town Council to the effect that all wiring and fittings become the property of the Town Council.

Holyhead.—ASSISTED WIRING.—The Electricity Committee and Urban District Council have been giving consideration to an assisted wiring scheme, and have decided to adopt one on the lines most favoured by other North Wales supply undertakings, providing for the installation of three lights and one domestic power plug. The consumer is to repay the Council at the rate of 5d. per week for six years, and to pay for any additional lamps or domestic power plugs *pro rata*. Prepayment meters are to be installed. The Council proposes to retail electrical appliances to consumers.

London.—FINSBURY.—The County of London Electric Supply Co., Ltd., has received a contract from the Borough Council to light ten miles of streets of the borough with electricity.

FULHAM.—The Borough Council has received sanction to a loan of £10,000 for mains extensions. Mains are now to be extended in Garleston Street, Werley Avenue, and St. Olaf's Road, at a cost of £875.

Malling (Kent).—ELECTRICITY FOR AYLESFORD AND RYARSH.—Permission has been granted to the Maidstone Corporation and the Kent Electric Power Co. to install electricity in parts of Aylesford and Ryarsh.

Nelson.—LOAN OF ELECTRIC RADIATORS.—Arrangements have been made for the loan of electric radiators without charge. It is probable that there will be application for about 3,000 radiators, the Corporation being involved in an expenditure of £1,000.

Northern Ireland.—KILKENNY.—An experiment is being carried out with a view to deciding whether to use electricity or gas for public lighting.

Plymouth.—MAINS EXTENSIONS.—The Electricity Committee is to lay mains on the Moor Farm Estate at a cost of £1,855.

Portsmouth.—EXTENSIONS.—The Electricity Committee is to extend mains to Clanfield at an estimated cost of £2,150, and is to give a bulk supply of electricity to the Gosport Aerodrome on condition that the Air Ministry provides a substation and installs rectifying plant at its own cost.

A good example of greyhound track illumination recently completed at Derby (see page 248)

Riccall.—EXTENSIONS AT BARLBY.—The Rural District Council has decided to offer no objection to the use of overhead lines and underground cables at Barlby by the Electrical Distribution of Yorkshire, Ltd.

Richmond (Yorkshire).—The Town Council is to extend its mains to the Ideal Homes Estate.

Ripon.—EXTENSIONS.—Sanction has been received by the Town Council to a loan of £1,210 for supplying electricity to Galphay, High Gratley, and Sawley. The Council proposes to give a supply to Markington at a cost of £1,800.

Shipley.—LOAN FOR MAINS SANCTIONED.—The Electricity Committee has received sanction to a loan of £10,000 for mains.

Spalding.—LOANS.—The Urban District Council has applied for sanction to a loan of £5,000 for h.p. cable extensions, and sanction has been received to the borrowing of £5,000 for mains and services, £1,500 for mains, and £2,500 for house wiring installations.

Stockton-on-Tees.—SUPPLY TO FAIRFIELD.—The Electricity Committee is to afford a supply of electricity to Fairfield at a cost of £4,390.

Sunderland.—LOAN SANCTIONED.—Sanction to the borrowing of £20,000 for mains has been received by the Electricity Committee.

Uttoxeter.—SUPPLY TO DENSTONE.—The Urban District Council has decided to inform the Electricity Commissioners that as soon as the extension to Rocester is completed the question of a supply of electricity for Denstone will have favourable consideration.

REDUCED CHARGES.—For large consumers electricity is to be

charged for at the rate of 7s. 6d. per quarter per 100 W of the lighting installed, plus 1d. per kWh consumed.

Wakefield.—ASSISTED WIRING.—The Electricity Committee is to apply for sanction to a loan of £5,000 for assisted wiring.

Wallsend-on-Tyne.—CABLE EXTENSIONS.—The Town Council has approved a scheme submitted by the North-Eastern Electric Supply Co., Ltd., for the laying of l.p. distribution cables for the Bewicke School housing scheme.

Walsall.—ESSINGTON WANTS ELECTRICITY.—The Essington Parish Council has requested the Electricity Committee to give the village a supply of electricity and a canvass of probable consumers is to be made.

Watford.—REDUCED CHARGES.—The Electricity Committee has decided to allocate £4,500 from the profits of the undertaking to rate relief, and to reduce its charges to bring about a saving of £16,000 a year to consumers.

West Hartlepool.—REDUCED POWER CHARGES.—The Electricity Committee has agreed to introduce a special rate of 1½d. per kWh for industrial concerns, if they agree to use no electricity for power purposes between 4 and 5 p.m. in the winter months. The existing scale varies from 3d. to 1½d. per kWh according to the quantity used.

Wimbledon.—REDUCTIONS IN HIRING CHARGES.—Reductions have been made in the hiring charges for cookers, irons, washboilers and water heaters.

Worthing.—EXTENSIONS.—The Electricity Committee is to provide a supply of electricity at a cost of £2,153 to enable Willowhayne Estate, Ltd., to develop its estate at East Preston. A supply is also to be given to the sewage works of the East Preston Council at Kingston Farm at a cost of £635.

Traction

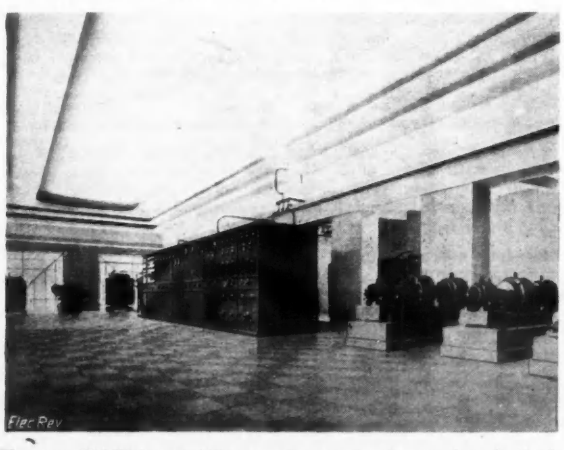
Bournemouth.—TROLLEY-BUSES v. TRAMWAYS.—A proposal was carried by the Town Council against vigorous opposition that a service of trolley-buses should be run between the Square and County Gates, a distance of about one mile. The proposal for the change was adopted on the grounds that trolley-buses were cheaper, cleaner and quieter than petrol buses; furthermore, £100,000 of the Corporation's capital is sunk in the generating station.

Burnley.—JOINT TRAMWAY CONTROL APPROVED.—The Corporation has approved the agreement for the joint control of the Burnley, Nelson, and Colne transport undertakings, subject to further negotiations with Nelson and Colne.

L.M.S. Railway.—AUTOMATIC SIGNALS.—The automatic colour-light signalling system between Camden and Watford has been completed. It enables the number of trains on the line to be increased and nine manual signal boxes to be abolished. Automatic train stops apply the brakes of a train should it run past a signal at "danger." Additional sidings are being provided at Euston for electric trains, and the station at Wembley is being remodelled.

EXPERIMENTAL DIESEL-ELECTRIC EXPRESS SERVICE.—A successful trial of a Diesel-electric express service between London (Euston) and Birmingham took place on Tuesday. This was the first time that a Diesel-electric train has run at express schedule on a British railway, and the 113 miles were completed in two hours and seven minutes, with a maximum speed of 65 m.p.h. The train will run regularly while the British Industries Fair is on, leaving Euston at 11.35 a.m. The service has been inaugurated by Sir W. G. Armstrong Whitworth (Engineers), Ltd., and Shell Mex & B.P., Ltd., with the co-operation of the L.M. & S. Railway Co.

L.N.E. Railway.—SUBURBAN ELECTRIFICATION.—With regard to the present position of the proposals to electrify the suburban lines in East London and beyond, Mr. Pybus stated in the House of Commons on Monday that the L.N.E. Railway Company had informed him that it had schemes of London suburban electrification under consideration and that in the event of the London Passenger Transport Bill becoming law it would be prepared to submit proposals to the Standing Joint Committee of the Transport Board and the railway companies which the Bill proposed to set up. He was not, however, fully aware of the details of the proposals which the company was likely to make.



The new 60-kW transmitting equipment in the spacious hall of Radio-Toulouse

London.—THE PASSENGER TRANSPORT BILL.—On Tuesday the London Passenger Transport Bill was read a third time by 232 votes to 46.

Middlesbrough.—TRANSPORT MERGER.—By 20 votes to 14 the Town Council has agreed to appoint a sub-committee to continue negotiations with the United Automobile Services, Ltd., for a merger with the Corporation's transport undertakings. The chairman of the Tramways Committee stated that the Corporation's trams and buses would this year show a loss of £24,000, making a total contribution from the rates during the Corporation's twelve years of ownership of over £160,000.

Communications

Belgium.—BROADCASTING CONFERENCE.—A new allotment of wave-lengths, to be known as the Lucerne Plan, superseding the existing Prague Plan, which has been rendered obsolete owing to the recent increase of the power of various stations, is the main problem before the International Broadcasting Union which met at Brussels under the Presidency of Vice-Admiral Sir Charles Carpendale, controller of the British Broadcasting Corporation, on February 9th. Great Britain and the other European countries (except Soviet Russia), as well as Egypt and Morocco, are represented, and the International Maritime Wireless Committee (represented by Commander Slee and two others) is taking part in the discussions. The Conference's first work was to appoint three committees, the technical committee taking up the main question of allocation of wave-lengths. They are expected to report to the main council by the end of the week and their conclusions will eventually be submitted to the full conference. All sittings are private, but a communiqué will be issued when the conference ends. Great Britain's representatives are Mr. Noel Ashbridge, chief engineer of the British Broadcasting Corporation, and two colleagues of his, Messrs. Hayes and Atkinson. The new plan will have to secure the approval of the various governments before it can come into operation.—*Reuter* (Brussels).

Great Britain.—RADIO LICENCES.—The total number of broadcast radio receiving licences in force at the end of January, 1933, was 5,364,000, representing an increase of some 101,000 as compared with the previous month.

RADIO RELAY EXCHANGES.—Cardiff Highways Committee has received applications from Gwalia Radio Relay Service, Ltd., and Mr. Howard Phillips, on behalf of the Cardiff wireless traders, for permission to operate a radio relay service in the city; a sub-committee has been appointed to report on the question.

Wolverhampton Corporation General Purposes Committee recommends that an agreement be entered into with Rediffusion, Ltd., granting to the company the general right to make attachments to Corporation properties upon payment of an annual acknowledgment of £10.

Worcester Corporation has received an application from a company and has called for a report on the subject from the city electrical engineer.

Halesowen Urban Council has deferred consideration of an application by Broadcast Listeners' Service, Ltd., until schemes in operation at Lincoln, Clacton-on-Sea, and Swindon have been studied.

Holland.—PHOTO-TELEGRAPHY.—The British Postmaster-General announces that a service of picture-telegraphy is now available between Great Britain (London) and Holland (Amsterdam). The conditions are the same as those for the similar services which are in operation between this country and Austria, Denmark, Germany, Italy, Norway, and Sweden.

Irish Free State.—NEW WIRELESS BEACON.—A new Marconi automatic wireless beacon is to be installed on the Irish lightship *Comet* to the order of the Irish Lights Commissioners. The beacon will have an energy of 100 watts in the aerial and will be operated in conjunction with a submarine sound signalling device to enable navigators to ascertain their distance and position with respect to the lightship.

Italy.—RADIO TELEPHONE SERVICE.—A short-wave radio-telephone service between the Vatican City and the Palace of the Pope at Castel Gandolfo, near Rome, was inaugurated by the Pope on February 11th. The installation of the stations, which will operate on a wavelength of 60 centimetres, has been personally supervised by Marchese Marconi. The distance between the two points is 20 km.

Philippine Islands.—RADIO-TELEPHONY.—The first telephone conversation between Manilla and Paris took place on February 13th. The circuit employed comprised land lines between Paris and Berlin, thence by radio, *via* Saigon, in French Indo-China, to Manilla.—*Reuter* (Paris).

Turkey.—NEW TELEPHONE SERVICE.—A telephone service is now available between London and Constantinople, the charge for a three-minutes call being £1 3s. between 8 a.m. and 7 p.m. and 14s. at other times.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Aberdeen.—February 27th. Royal Mental Hospital. Electric lighting work at new branch hospital. G. Bennet Mitchell & Son, architects, Bon Accord Square, Aberdeen.

Australia.—MELBOURNE.—March 7th. Department of Posts and Telegraphs. Telephone handsets. (A.X. 11675.)*
March 21st. Tumbler switches. (A.X. 11676.)* Telephone terminal strips. (A.X. 11677.)* Microphone component parts. (A.X. 11678.)*

Aylesbury.—February 22nd. Electricity Department. General electrical stores. (February 10th.)

Bedford.—February 27th. Electricity Department. Underground cables and lamp. (February 10th.)

Bexley.—Electricity Department. Transformers, including cable work and switchgear. (February 10th.)

Blackburn.—February 27th Electricity Department. Cable, rubber insulated wire, and meters. (January 20th.)

Dover.—March 3rd. Electricity Department. Cables. (See this issue.)

Edinburgh.—March 9th. Electricity Department. Electrical stores. (See this issue.)

Harrogate.—February 24th. Corporation. Electric lamps for twelve months. Mr. C. E. Rivers, borough engineer and surveyor, Municipal Offices, Harrogate.

India.—February 28th. Bengal and North Western Railway Co., Ltd. 26,500 tungsten filament lamps. (February 10th.)

Kettering.—February 24th. Electricity Department. E.h.p. and l.p. underground cables. (February 10th.)

Leeds.—February 21st. Electricity Department. Annual contract for stores. (January 27th.)
March 7th. Transformers. (February 10th.)

London.—HAMMERSMITH.—February 22nd. Borough Council. General stores. (January 27th.)

Long Eaton.—March 1st. Electricity Department. Cables, coal, service meters, and service cut-outs. (February 10th.)

Manchester.—March 1st. Electricity Department. Electric cookers. (See this issue.)

Milford Haven.—February 28th. Electricity Department. Goods and materials, including meters. (See this issue.)

Oldham.—March 2nd. Public Assistance Committee. Electric lamps and fittings for Rochdale Road Institution. Public assistance officer.

Penicuik.—February 23rd. Town Council. Electric lighting at forty houses. Messrs. Morham & Brotchie, surveyors, 29, Hanover Street, Edinburgh.

Portsmouth.—March 3rd. Corporation. General stores. (See this issue.)

Rhondda.—March 25th. Electricity Department. Meters, copper wire, joint boxes, &c. (See this issue.)

Salford.—February 23rd. Electricity Department. Electrical apparatus and stores. (February 3rd.)
March 2nd. General electrical stores. (February 10th.)

South Africa.—JOHANNESBURG.—March 2nd. 6,600-V switchboard cubicles. (A.X. 11692.)*

Stoke-on-Trent.—March 6th. North-West Midlands J.E.A. Transmission lines and outdoor static transformers. (January 27th.)

Sunbury-on-Thames.—February 20th. Urban District Council. Electric wiring of twenty-four houses, Charlton Road. Mr. H. F. Coales, surveyor, Council Offices, Sunbury-on-Thames.

Swansea.—April 1st. Electricity Department. Stores for twelve months. (February 3rd.)

Torquay.—February 20th. Corporation. Twelve months' supply of electric lamps, &c. Borough engineer.

Walthamstow.—February 24th. Electricity Department. L.p. distributor and service cables. (See this issue.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Basford.—Notts County Council. Accepted. Electric lighting at institution extension (£210).—McLennan & Co., Mansfield.

Cardiff.—Health Committee. Accepted. Shadowless lamps for operating theatre at Llandough Hospital (£64).—G.E.C. Electricity Committee. Accepted. Feed water heater (£190).—G. & J. Weir, Ltd. Metering equipment and switchgear (£906).—Allen West & Co., Ltd. Circuit breakers (£403).—Messrs. Ferguson, Pailin, Ltd.

Carlisle.—Electricity Committee. Accepted. Two 100-kVA transformers (£74 each).—Yorkshire Electric Transformer Co., Ltd.

Durham.—County E.C. Accepted. Installation of electric lighting in schools. Broom Cottages (£215) and Tudhoe Colliery (£131).—W. Sykes & Co. Blaydon East (£239).—F. Reid, Ferens & Co. Dunston Hill (£289).—Robson & Coleman. Greenside (£107).—B. L. Oliver. Houghton-le-Spring (£217).—Law & Burns. Chester-le-Street (£482).—R. W. Leek & Co.

Farnham.—Highways Committee. Recommended. Vehicle actuated traffic signals (£397).—Automatic Electric Co., Ltd.

Faversham.—Town Council. Accepted. Three miles of four-core cable (£639) and 550 yards of similar cable (£115).—W. T. Henley's Telegraph Works Co., Ltd.

Holyhead.—Urban District Council. Accepted. Assisted wiring for next six months.—J. Truscott.

London.—L.C.C.—Central Public Health Committee. Accepted. Wiring and fittings for electric lighting, block "C," Hackney Hospital (£662).—Samuel Reed & Sons. Wiring and fittings for electric lighting in administrative block extension, Northern Hospital (£265).—Barlow Bros. & Co. Electric bed lift, St. Alfege's Hospital, Greenwich (£633).—Etchells, Congdon & Muir, Ltd.; electric lighting and power (£825).—Buchanan & Curwen. Automatic telephone system, St. Stephen's Hospital, Chelsea (£942).—L. G. Tate & Co., Ltd.
Housing Committee. Recommended. Electrical installations at Bow Bridge estate (£538), and Brockley estate (£347).—Hall & Stinson.

Newcastle-upon-Tyne.—Trade and Commerce Committee. Recommended. Five-ton electric crane for the Ouseburn quay extension scheme (£2,110).—Clarke, Chapman & Co.

Rugby.—Town Council. Accepted. Cables.—W. T. Henley's Telegraph Works Co., Ltd. (£588); Derby Cables (£570).

Spenborough.—Urban District Council. Accepted.—Electrical work at fifty houses on the Firthcliffe Estate.—Hepworth & England.

Swansea.—Electricity Committee. Accepted. Two overhead travelling cranes for new power station (£6,062).—Sir William Arrol & Co., Ltd.

Teesdale.—Education Committee. Accepted. Installation of electricity in the Middleton Council Schools (£118).—J. Bell.

Wallasey.—Electricity Committee. Accepted. Reactors, transformers, &c., for Dock Road area (£3,765).—English Electric Co., Ltd. Switchgear (£3,898).—Metropolitan-Vickers Electric Co., Ltd.

Worthing.—Town Council. Recommended. Installation of traffic signals at the Town Hall (£362).—Automatic Electric Co.

Forthcoming Events

British Electrical Development Association.—Friday, February 17th. Caxton Hall, S.W. 7.30 p.m. Discussion on "Water Heating." Opened by Mr. P. C. Honey. (*Northern Counties Area*).—Thursday, February 23rd. Sopwith's Lounge, Newcastle-upon-Tyne. 7.15 p.m. "Domestic Water Heating." Mr. P. Ward.

British Industries Fair.—February 20th-March 3rd. Castle Bromwich, Birmingham, and Olympia and White City, London.

Electrical Engineers' Ball.—Friday, February 17th. Grosvenor House, Park Lane, W.

Association of Mining Electrical Engineers.—Friday, February 17th. Royal Hotel, Cardiff. 7 p.m. Annual dinner and dance.

Institute of Marine Engineers.—Friday, February 17th. Connaught Rooms, W.C. 7 p.m. Annual dinner.

Institution of Mechanical Engineers.—Friday, February 17th. Institution, London. 5.30 p.m. Annual general meeting.

Physical Society.—Friday, February 17th. Imperial College of Science and Technology, S.W. 5 p.m. Short papers.

Association of Supervising Electrical Engineers.—Saturday, February 18th. Trocadero Restaurant, W. 6.30 for 7 p.m. Annual dinner and reunion. Tuesday, February 21st. Junior Institution of Engineers, London. 7.15 p.m. "Modern Electric Signs." Capt. C. Higgins.

Institution of Civil Engineers.—Tuesday, February 21st. Institution, London. 6 p.m. Short papers.

Institution of Electrical Engineers.—Thursday, February 23rd. Institution, London. 6 p.m. "The Characteristics of Submarine Telephone Cables at Carrier Frequencies." Mr. E. W. Smith. (*Western Centre*).—Monday, February 20th. South Wales Institute of Engineers, Cardiff. 6 p.m. "Oil Filled Electric Cables." Mr. R. E. G. Horley. (*Tees-side Sub-Centre*).—Monday, February 20th. Cleveland Technical Institute, Middlesbrough. 6.45 p.m. "The Steel-Melting Coreless Induction Furnace." Mr. M. J. Marchbanks. (*North-Midland Centre*).—Tuesday, February 21st. Hotel Metropole, Leeds. 7 p.m. "Electric Lighting of Buildings." Mr. A. B. Read and Dr. J. W. T. Walsh. (*Dundee Sub-Centre*).—Tuesday, February 21st. Kidd's Restaurant, Dundee. Informal discussion. (*London Students' Section*).—Tuesday, February 21st. Victoria Hall, W.C. 8 p.m. Dance. (*North-Western Students' Section*).—Tuesday, February 21st. Engineers' Club, Manchester. Smoking concert. (*North-Eastern Centre*).—Wednesday, February 22nd. Literary and Philosophical Society, Newcastle-upon-Tyne. 7 p.m. Faraday lecture. "Lightning—and how the Engineer deals with its effects." Prof. J. T. MacGregor-Morris. (*South Midland Students' Section*).—Wednesday, February 22nd. Benn Buildings, Rugby. 7 p.m. "Electrical Equipment of Warships." Mr. F. C. Duffield. (*North-Eastern Students' Section*).—Friday, February 24th. Armstrong College, Newcastle-upon-Tyne. 7.15 p.m. Debate, "Electric *versus* Diesel-Electric Locomotives." Saturday, February 25th. Joint visit with the graduates of the N.E. Coast Institution of Engineers and Shipbuilders to the works of the Premier Electric Welding Co., Ltd.

Birmingham Electric Club.—Friday, February 24th. Grand Hotel, Birmingham. 7 p.m. "Electricity Supply Co-ordination." Mr. S. T. Allen.

Electrical Power Engineers' Association (London Technical Group).—Saturday, February 25th. Café Royal, W. 7 p.m. Annual dinner and dance.

Notes

The Birmingham Fair Programme

Monday, February 20th.—Luncheon: Official opening.

Tuesday, February 21st.—Tea: Electrical Association for Women.

Wednesday, February 22nd.—Luncheon: Institution of Electrical Engineers (South Midland Centre), Incorporated Municipal Electrical Association (Midland Area), Electrical Wholesalers' Federation, Association of Supervising Electrical Engineers, Electrical Contractors' Association, Electrical Contractors' Association of Scotland, Illuminating Engineering Society, Tramways, Light Railways and Transport Association.

Thursday, February 23rd.—Tea: Electrical Association for Women.

Friday, February 24th.—Luncheon: Association of Mining Electrical Engineers.

Saturday, February 25th.—Luncheon: Electrical Power Engineers' Association. Tea: Institution of Electrical Engineers (South Midland Students' Section).

Wednesday, March 1st.—Luncheon: Institution of Electrical Engineers (Council), Incorporated Municipal Electrical Association (Council), British Electrical Development Association, Incorporated Association of Electric Power Companies, Provincial Electric Supply Association, Association of Consulting Engineers, London Electricity Supply Association, British Electrical and Allied Manufacturers' Association (Council).

Annual dinner: British Electrical Development Association (South Midland Area).

Thursday, March 2nd.—Electrical Wholesalers' Federation.

British Traction Plant

On Tuesday the Prince of Wales visited the Southgate extension of the Piccadilly Railway and inspected a mercury arc rectifier sub-station and control room. These were described and illustrated in the ELECTRICAL REVIEW of September 23th, pp. 419, 420, and 444. The London Electric Railway Co. was the first and is the largest user of rectifiers for traction in Great Britain. The earliest (a B.T.H. machine) was started up at Hendon in 1930, and was the first to be manufactured in this country, and now thirty-six are in use; twenty-three equipments, including switchgear, high-speed circuit

The Prince of Wales in the driver's cabin of an Underground train on Tuesday, when he inspected the new Arnos Grove line

breakers, and control apparatus on the northern section were supplied by the British Thomson-Houston Co., Ltd., and thirteen on the western section by the General Electric Co., Ltd. All are entirely of British manufacture, and are automatic in operation. In all some 1,380 electric control equipments (including the dead man's handle, introduced on the Central London Railway in 1900) and 1,438 traction motors have been supplied to the L.E.R. by the B.T.H. and 1,600 by the G.E.C. for most strenuous traction conditions.

An E.P.E.A. Dinner

Proposing the toast of the Electrical Power Engineers' Association at the annual dinner of the local branch at Southsea on February 11th, Mr. B. Handley, the engineer and manager of the Portsmouth Electricity Department, remarked that the Association had undoubtedly done much to better conditions in the profession. The Displacements Committee was now in operation, and it was the Association's job to see that the effects of displacement, due to the working of the Central Electricity Board, were met promptly, so that the disgrace of throwing men out of work could be avoided. Trade unions, under whatever name they functioned, were necessary to all occupations, and the good understanding that existed between employers and employés in the electrical industry reflected great credit upon the work of the Association.

Mr. A. J. Duffy (president), responding, said that the Association had changed many things in the industry since the days of long hours and small salaries. The developments that were taking place in the electrical world were bound to throw some of the present station engineers out of employment, but he saw no reason why they should not be absorbed in the sales service, where, after a short period of training, they could render as efficient service as they had in engineering.

E.A.W. South-Western Conference

The South-Western Conference of the Electrical Association for Women is to be held in Torquay next week. On February 22nd at 8.30 p.m. a reception will be followed by a dance. After the opening of the Conference by the Mayor at 10.45 a.m. on February 23rd, Sir John Brooke will speak on "Rural Electrification" (chairman, Mrs. Chas. Williams). At 3 p.m. Catherine, Countess of Westmorland, will give an address on "The Formation of the South-Western Counties Federation" (chairman, Lady Astor, M.P.). The conference banquet will be held at 8 p.m. at the Victoria and Albert Hotel. On February 24th there will be a morning visit to Buckfast Abbey and Seale Hayne College, and in the afternoon a lecture on "Electricity" by Sir Hugo Hirst, Bt. (chairman, the Mayor), followed by an inspection of the modern lighting system at the Palladium, Paignton. In the evening at 8 p.m. Mrs. Penders Chalmers will describe "An Aerial Holiday" (chairman, Mr. W. R. Parkhouse). The sessions will be held at the Conference Headquarters, the Victoria and Albert Hotel.

Successful Appeal Against a Surcharge

An appeal lodged with the Minister of Health in respect of surcharges made by a district auditor against a chief engineer and manager of a supply undertaking has resulted in the quashing of the surcharges. Arising out of a report drawn up in 1931 by a new accountant to the Grange-over-Sands U.D.C., criticising the book-keeping in the electricity undertaking, allegations were made at a meeting of the Electricity Committee that sums of money and electrical appliances were unaccounted for. The engineer, Mr. J. Sims, who was appointed to his position in June, 1926, emphatically repudiated the allegations. On February 2nd, 1932, he was asked to resign; on his refusal, he was informed that his services were no longer required. A few days later the Electrical Power Engineers' Association made representations to the Council that the decision to dismiss Mr. Sims should be reconsidered. The Council then recommended the taking of an extraordinary audit of the accounts of the Electricity Department covering the period from April 1st, 1931, to the date of the dismissal.

The district auditor issued a certificate on March 22nd, 1932, in which he surcharged Mr. Sims in the sums of (1) £12 2s. 8d., money not paid into the Council's account, (2) £3 4s. 6d., amounts received for the sale or hire of articles and not brought into account, and (3) £10 16s. 6d., representing articles received into store and unaccounted for. As a result of action by the E.P.E.A., the Minister of Health appointed an inspector who heard an appeal on September 27th. Mr. J. W. Thomas, instructed by Messrs. Cole & Matthews, appeared for Mr. Sims, and Mr. Mossop, a chartered accountant, gave evidence after examining the books and stores of the Council. The decision of the Minister was given on January 25th. He stated that the surcharge of £12 2s. 8d. related to a period for which the accounts had been closed and audited and was *ultra vires*. Regarding the other two sums, the Minister stated that there was evidence that certain items included had been accounted for and that it had not been proved beyond doubt that there had been any loss. He criticised the system of keeping check on cash and stores, which had given rise to surcharge of the district auditor, but the view of the Association was that Mr. Sims should not have been held responsible for a defective system, to rectify which the accountant should have co-operated with him. The Association is considering the taking of further steps to vindicate the character of Mr. Sims.

Batti-Wallahs' Luncheon

The next luncheon of the Batti-Wallahs' Society will be held on February 21st at the Hotel Metropole, when the chief guest will be Earl Howe, who will speak on motor racing.

The Physical Society

The next meeting of the Physical Society will be held at 5 p.m. this evening (Friday), at the Imperial College of Science and Technology, Imperial Institute Road, South Kensington, S.W.7. The following papers will be read: "The transmission of heat through fabrics," by M. C. Marsh; "A compact electromagnet for general purposes," by L. F. Bates; "On the spurious ring exhibited by fluorescent screens," by J. V. Hughes; "The direct recording of relative intensities by means of a microphotometer," by N. Thompson, and a demonstration of short-wave apparatus (postponed from the last meeting) by Dr. W. L. Yates Fish.

Appointments Vacant

Assistant examiners for Patent Office.

Installation and meter superintendent and sub-station attendant for Colchester Electricity Department.

(See our classified advertisements.)

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of the makers of the following:—

PEARL bowl fire.

Thermostatically controlled soldering irons.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

At a meeting of the Ipswich Corporation held on February 8th it was decided to increase the salary of **Mr. H. E. Blackiston**, chief engineer and manager of the Electricity Supply and Transport Department, from £1,100 to £1,250, as from April 1st next. The following promotions were also approved as from April 1st:—Mr. H. B. Campbell, technical assistant, to be designated assistant station superintendent and transferred from grade 7 (£370 per annum) to grade 6 (£412) of the N.J.B. schedule; Mr. Q. F. Parker, sub-station superintendent, and Mr. L. Webb, mains engineer, outside borough, transferred from grade 8b (£319) to grade 8 (£346) from April 1st next, and to grade 7 (£370) from April 1st, 1934; Mr. F. M. Poole, mains assistant, transferred from grade 10 (£209) to grade 9a (£235) from April 1st next, and to grade 9 (£267) from April 1st, 1934; Mr. A. Young, meter assistant, transferred from grade 9a (£235) to grade 9 (£267); Mr. A. Butler, traffic superintendent on the trolley-bus system, was also granted an increase in salary of £25 (from £375 to £400). The chairman of the Committee, Mr. S. Charles Grimwade, also paid a tribute to the service of Mr. W. A. Fairhead, power station superintendent, who retires on superannuation on March 29th.

Mr. R. N. Tweedy, the author of "The Story of the Shannon" which appears on page 241

Mr. H. C. J. Haddon, district inspector of the L.M.S. Railway's electric trains on the Euston, Broad Street, Watford, and Richmond services, has retired after 42 years' service. He joined the City and South London Railway as an assistant electric train driver when the railway was first opened for traffic on December 18th, 1890, and in 1900 drove the first passenger train to run on the old "Twopenny Tube" (the Central London Railway).

Mr. S. B. Jackson, A.M.I.E.E., of the Central Electricity Board, has been awarded the Sir Archibald Denny Gold Medal by the Council of the Institute of Marine Engineers for his paper entitled "Pulverised Fuel Firing with Special Reference to Power Station Practice," read in March, 1932. The presentation will be made at the forthcoming annual general meeting of the Institute.

Mr. K. Sanderson has been elected a director of the Scottish Power Co. to fill the vacancy caused by the death of Mr. H. Brown.

Mr. Ronald A. Fearnley, who, as we have already reported, has been appointed transport engineer to the Coventry Corporation, commenced his career as an apprentice in the works of the Sheffield Corporation Tramways and Motors, and after passing through various intermediate positions was for three years chief assistant engineer in that Department. In 1925 he was appointed general manager and engineer of the Keighley Corporation tramways, and in 1929 he took up a similar position at Southend-on-Sea. He was responsible for reorganising the Southend - on - Sea undertaking as a separate business, and after the Southend Corporation Act, 1930, was responsible for the extension of the trolley vehicle system. In addition, new motor omnibus services have been introduced, and during 1932 an agreement was completed between two local motor omnibus companies and the Corporation by which the whole of the services in the county borough were co-ordinated. Mr. Fearnley is an associate member of the Institution of Automobile Engineers and a member of the Institute of Transport.

Mr. R. A. Fearnley

Mr. L. A. Gripper, A.M.I.E.E., who, as announced in our last issue, has been recommended for the appointment of deputy electrical engineer to the Eastbourne undertaking, commenced his career as a pupil at the Blackburn Corporation electricity works, and after war service, returned to Blackburn for a short period. He then joined the Mains Department of the Newcastle Electric Supply Co., with whom he remained for several years. He subsequently held positions with the English Electric Co., Ltd., and the North Metropolitan Electric Power Supply Co. Eight years ago he joined the Croydon Corporation Electricity Department, rising to the position of distribution superintendent. He has taken considerable interest in training and teaching work called for by the rapid growth of the Croydon undertaking, and for a number of years was associated with the Croydon Polytechnic evening classes as lecturer to the generation, transmission and distribution senior classes, and to the installation and wiring class. He produced the "Gripper" cable protection system. Mr. Gripper has contributed several articles to the pages of the ELECTRICAL REVIEW.

Mr. L. A. Gripper

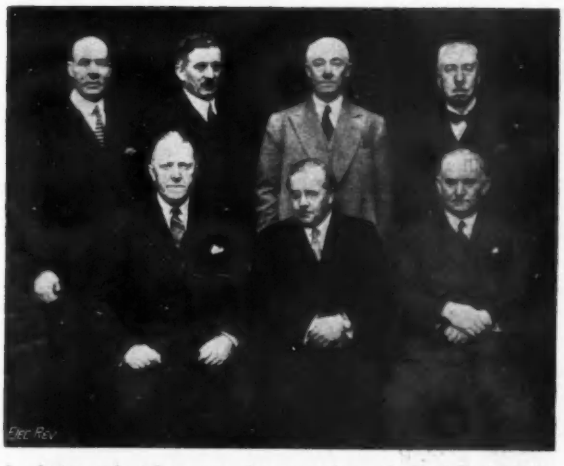
Mr. H. R. Harper, chief engineer to the State Electricity Commission of Victoria, who has been elected president of the Australian Institution of Engineers

Colchester City Council has made the following appointments of district managers in connection with the electricity extensions:—Walton - on - the-Naze, **Mr. F. Chignell,** late shift charge engineer; Manningtree, **Mr. W. W. Andrews,** sub-station assistant; Mersea and Tiptree, **Mr. W. D. Wray,** technical assistant.

Mr. R. H. Cobbold has been appointed changeover engineer and general temporary assistant engineer at the Winchester electricity works.

Mr. Donald Wilman has resigned his position as testing and research engineer to the Benjamin Electric, Ltd., and is joining the Electric Street Lighting Apparatus Co.

Sir Kingsley Wood, the Postmaster-General, visited the Strowger Works of the Automatic Electric Co., Ltd., Liver-



A photograph taken on the occasion of the Postmaster-General's visit to the Strowger Works of the A.E.C. Left to right sitting: Sir Alexander Roger (chairman, B.I.C.), Sir Kingsley Wood (P.M.G.), Mr. T. A. Eades (director and manager); standing: Col. Kemp (postmaster surveyor, Liverpool), Mr. J. Nixon (director and chief engineer), Mr. T. E. Herbert (superintending engineer, P.O. Telegraphs, S. Lancs Div.).

pool, on February 8th. He was received at the works by Sir Alexander Roger (chairman, British Insulated Cables, Ltd.), and Messrs. T. A. Eades (director and manager), A. F. Bennett (director and chief engineer), and J. Nixon (director and works manager).

Sir Kingsley witnessed the manufacturing processes for the various components required for an automatic telephone exchange, and also inspected a range of electrical appliances made at the company's other works at Broad Green.

Mr. Waldo Maitland draws our attention to the fact that the address of Messrs. Waldo Maitland & Partners was wrongly given in our issue of February 3rd. The correct address is 32, Bloomsbury Street, W.C.1.

Dr. E. Bowden was unable to give his lecture on "The New E.h.t. Gas Pressure Cable" before the London Technical Group of the Electrical Power Engineers' Association on Tuesday last, owing to illness. We are officially informed that he will deliver it on March 7th.

Mr. James Elliott, of Manchester, has been elected president of the Institution of Heating and Ventilating Engineers for the ensuing year.

Obituary

Mr. J. McNeil.—The death is announced at Bournemouth of Mr. John McNeil, late director of Telegraph Engineering, Indian Post and Telegraph Department.

Signor F. Manfredi.—The death is reported from Milan, Italy, at the age of 50 years, of Signor Francesco Manfredi, the chief engineer of the municipal electricity undertaking of that city and a member of the Italian Electrotechnical Council.

Dr. Ing. T. Bell.—The death is reported from Kriens, Lucerne, at the age of 93 years, of Dr. Ing. Theodor Bell, one of the leading engineers in Switzerland, and head of the company manufacturing the Bell turbines for hydro-electric stations.

Mr. H. C. Hambro.—The death is announced of Mr. H. C. Hambro, which occurred on February 14th, at his home, The Hyde, near Luton, at the age of 63. He was a director of Cables & Wireless, Ltd., Imperial & International Communications, Ltd. (and associated companies), Marconi's Wireless Telegraph Co., Ltd., and the Western Telegraph Co. (and asociated companies).

Mrs. Alexander Siemens.—We regret to learn of the death, which occurred on February 10th, at 35, Millington Rd., Cambridge, of Frances Siemens, widow of Mr. Alexander Siemens, aged seventy-six years.

Mr. H. V. W. Roberts.—The funeral of Mr. H. V. Wynne Roberts, of the General Electric Co., Ltd., took place at Ealing on February 8th, as reported last week. The family mourners included Mrs. Wynne Roberts (widow), Messrs. E. W. Roberts and I. W. Roberts (sons), Miss Gladys Wynne Roberts (sister), Miss Vaughan Roberts (aunt), Miss Joan Roberts (niece), Mr. Eric Roberts (cousin), Sister Young (cousin), and Mr. and Mrs. Calvert Smith. The following members of the directorate of the General Electric Co., Ltd., were present: Sir Hugo Hirst, Bart., Mr. M. J. Railing, Dr. A. H. Railing, Messrs. J. Y. Fletcher, L. C. Gamage, G. H. Ide, S. D. White, and C. Wilson, supported by nearly two hundred members of the staff, including representatives from every works and branch, and by a large number of well-known members of the electrical industry.

Will.—Sir Dugald Clerk left £54,412 (net personalty £41,005). He made large bequests to the Royal Society, the Royal Institution, the Royal Society of Arts, the Institutions of Civil and Mechanical Engineers, and to various universities.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Sir Evan Jones, Baronet, and Abboud Pasha, Ltd.—Private company. Registered on February 7th. Capital of £100,000 in £1 shares. Objects: To tender for the construction of a barrage proposed to be erected by the Egyptian Government at Gebel Aulia, Sudan, and in the event that such tender is accepted, to enter into and carry out the construction of the said barrage; to carry on in Egypt, the Sudan and elsewhere as may be necessary, the business of general contractors, builders, civil, mechanical and electrical engineers, &c. The subscribers are: His Excellency Ahmed Abboud Pasha, Cairo; Sir Evan D. Jones, Bt., 11, Great George Street, S.W.1; and Topham Jones & Railton, Ltd., 11, Great George Street, S.W.1, by Sir Evan D. Jones, managing director. The business of the company is to be managed by the directors in Egypt or at some other place to be agreed on outside the United Kingdom. Secretary (pro tem.): J. B. Whelan. Registered office: 11, Great George Street, S.W.1.

Moffats, Ltd.—Private company. Registered February 6th. Capital, £5,000 in £1 shares. Objects: To take on lease or otherwise acquire the weaving shed and premises forming part of India Mill, Skew Bridge, Blackburn, and to carry on the business of manufacturers of and dealers in stoves, boilers, geysers, refrigerators and cooking and heating apparatus, &c. The directors are: Donald R. Moffat, Parkhey, East Park Road, Blackburn (director of Moffat, Ltd., of Weston, Ontario, Canada), and T. R. Clark, 24, Lamack Road, Blackburn. Solicitors: John Taylor & Co., 41, Ainsworth Street, Blackburn.

Power Specialities, Ltd.—Private company. Registered February 8th. Capital, £2,000 in £1 shares. Objects: To carry on the business of manufacturers, suppliers and factors of electrical, mechanical and automobile machines, equipment and appliances, &c. The directors are: David H. Cockburn, 34, Richings Way, Iver, Bucks, and two others. Secretary: Charles D. Clarke. Registered office: Viaduct Works, Wrexham Road, Slough, Bucks.

British Heaters (Camberwell), Ltd.—Private company. Registered February 13th. Capital, £2,000 in £1 shares (1,000 7 per cent. cumulative preference and 1,000 ordinary). Objects: To carry on the business of assemblers of electrical equipment and manufacturers of sheet metal and other gas stoves, electric irons, and light articles of a similar nature, formerly carried on by W. H. Baker at 122, Camberwell Road, S.E. The first directors are: William H. Baker, 15, Aubert Park, Highbury, N.5; and Charles D. Waller, 157, Westwood Park, Forest Hill, S.E.23. Solicitor: Walter A. Maslen, 159, Old Christchurch Road, Bournemouth.

Fractional H.P. Motors, Ltd.—Private company. Registered February 13th. Capital, £2,000 in £1 shares. Objects: To carry on the business of manufacturers and dealers in electric motors, dynamos, batteries, &c. The subscribers are: Alexander MacGregor, 80, Ashburton Avenue, Croydon; and Henry A. Turner, 159, Railton Road, Herne Hill, S.E.24. Registered office: West Heath Works, Rookery Way, Hendon, N.W.9.

Rothery Radio, Ltd.—Private company. Registered January 31st. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in radio apparatus, &c. The subscribers are: G. Laycock, 31, Lynndale Avenue, Birkby, Huddersfield; and M. Pearson, 183, Luck Lane, Paddock, Huddersfield. Registered office: 17, Baldwin Street, St. Helens, Lancs.

Returns of Electrical Companies

Edmundson's Electricity Corporation, Ltd.—Particulars have been filed of debenture stock to secure £2,500,000, and any further stock, provided that the aggregate nominal amount of all stock issued and outstanding shall never exceed the nominal amount of the share capital issued, authorised December 28th, 1932, and covered by trust deed dated February 2nd, 1933. The amount of the present issue is £2,500,000. Property charged: The company's undertaking and property, present and future, including uncalled capital. Trustees: Prudential Assurance Co., Ltd.

Simplex Conduits, Ltd.—Capital, £100,000 in 10,000 preference shares of £5 and 50,000 ordinary shares of £1. Return dated November 10th, 1932. 10,000 preference and 40,000 ordinary shares taken up. £50,000 paid on the preference shares. £40,000 considered as paid on the ordinary. Mortgages and charges, nil.

British Brown-Boveri, Ltd.—Capital, £50,000 in £5 shares. Return dated November 24th, 1932. All shares taken up. £21,250 paid, being £2 10s. per share on 8,500 shares. £7,500 considered as paid on 1,500 shares. Mortgages and charges, nil.

Premier Electric Welding Co. (Newcastle), Ltd.—Mortgage on freehold hereditaments known as Premier Buildings, Orchard Street, Newcastle-on-Tyne, dated January 20th, to secure £2,500 and any further advances. Holders: Newcastle-upon-Tyne Permanent Building Society, 32-36, Grainger Street West, Newcastle-on-Tyne.

Alldays & Onions, Ltd.—Capital, £50,000 in £1 shares. Return dated December 16th, 1932. 33,077 shares taken up. £33,077 paid. Mortgages and charges: £35,000.

Electric Reduction Co., Ltd.—Capital, £50,000 in 16,200 preference and 33,800 ordinary shares of £1. Return dated December 6th, 1932. 16,200 preference and 28,800 ordinary shares taken up. £18,000 paid on 13,000 preference and 5,000 ordinary shares. £270,000 considered as paid on 3,200 preference and 23,800 ordinary shares. Mortgages and charges, £25,000.

Stearn Electric Co., Ltd.—Capital, £4,000 in £1 shares. Return dated November 29th, 1932. All shares taken up. £2 paid. £3,998 considered as paid. Mortgages and charges, £9,700.

Smithfield Markets Electric Supply Co., Ltd.—Satisfaction in full on May 1st, 1910, of second charge dated May 19th, 1899, amounting to £3,000, and registered September 25th, 1908. (Notice filed February 8th, 1933.)

General Accessories Co., Ltd.—Particulars filed of £5,000 debentures authorised January 4th, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Electriclocks and Radio, Ltd.—Particulars filed of £300 debentures authorised January 9th, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Smethurst & Co. (London), Ltd.—H. L. Ratcliffe, 292, High Holborn, W.C., was appointed receiver and manager on February 3rd, in place of F. C. S. London, resigned, under powers contained in debenture dated October 21st, 1931.

McGoff & Vickers, Ltd.—Capital, £2,000 in £1 shares. Return dated November 29th, 1932. 1,750 shares taken up. £1,750 paid. Mortgages and charges, nil.

City Notes

The London Power Co., Ltd., held its annual meeting on February 9th, Sir Francis Fladgate presiding. In presenting the report and accounts, the chairman said in consequence of the voluntary liquidation of the Central Electric Supply Co., Lord Wargrave, who was the representative of that company on the board, now represented the Westminster Electric Supply Corporation, and Mr. D. M. Touche had resigned from the board. The capital expenditure had amounted to approximately £1,750,000, which included the whole of the cost of the company's four coal steamers; two further steamers had been ordered of slightly larger tonnage, for delivery in the course of the year. In spite of the continued national depression 1,008,264,304 kWh was generated during 1932; this was the first time that any undertaking in this country had generated more than a thousand million kWh in one year. The output from the stations was 963,405,452 kWh, an increase of 7.08 per cent. over the preceding year. This included substantial supplies to the Central Electricity Board from Willesden, Grove Road, and Deptford West stations. He could not but look forward to the success of the Board, feeling that it was in fact doing for the whole country what their company had done for the Metropolitan districts which they served. It had not been considered advisable to press forward the works at Battersea, but they had progressed in a satisfactory manner, and they were now approaching the time when they would take the works into use. This would mark the practical completion of the second part of their scheme. The interconnecting mains of 22,000 V were completed in 1928. The average operating cost in 1924 of the constituent companies was 0.55d. per kWh, in 1931 the figure was 0.2176d., and for last year 0.2026d. This would show a considerably greater reduction than 50 per cent., but the comparison must be qualified by reducing the price of coal, which in 1924 was approximately 27s. 7d. per ton, while to-day it averaged 17s. 7d. per ton. The total costs were 0.9279d. per kWh in 1926 and 0.5608d. in 1931, reduced to 0.5279d. in 1932. The expenditure requisite to meet their obligations and to complete Battersea rendered it necessary to increase their debenture stock. Authority had been given to issue £20,000,000 debenture stock, and of this £17,000,000 5 per cent. stock had been issued. It was deemed advisable to take advantage of the present financial position, and consequently the board decided to create £3,000,000 4 per cent. debenture stock, thus exhausting their existing powers. Of this amount £1,000,000 had been successfully placed at 101½ per cent. They looked to further economies when the Battersea station was placed in commercial operation, and in order to secure that the machinery already sanctioned might be continuously used to its full normal capacity an additional generating plant had been applied for, to be available as a spare or standby against accidents. This scheme had been approved by the Central Electricity Board, and was now before the Electricity Commissioners. No additions to the boiler house were necessary. The experiments by the company's chemists on flue gas washing having been brought to a successful issue, the main experimental plant at Grove Road had been dismantled, and the necessary apparatus for the washing of the flue gases at Battersea was being installed; when that station was in commercial use, the fear as to emission of sulphur fumes will be found to be groundless. Sir Francis concluded his speech by paying tributes to the engineer-in-chief, Dr. Pearce, the general manager, Mr. Pearman, and to the staff.

The North Metropolitan Electric Power Supply Co. reports a net revenue for the year ended December 31st last of £616,159, as compared with £508,765 in the preceding year, to which is added £16,636 brought in, making £632,795. After deducting debenture interest, &c., and placing £221,000 to depreciation and reserve account, and £25,000 to contingency account, there is a balance of £268,867. It is proposed to pay a final dividend of 6 per cent. on the ordinary shares, making 10 per cent. for the year, leaving £29,470 to be carried forward. The capital expenditure during the year, mainly upon plant, machinery, trunk, and distributing mains and sub-stations, amounted to £610,317. Approximately 142 miles of underground mains were laid and nineteen miles of overhead lines were erected, making a total length of lines of 2,005 miles. The sales of electricity amounted to 298,700,000 kWh, as compared with 259,900,000 kWh in 1931, and the number of consumers supplied either directly or indirectly was 185,800 (against 161,700). The company's service was extended during the year to sixteen additional villages, and also to the London Electric Railway Co.'s Finsbury Park-Cockfosters extension. New showrooms were opened at Kenton and Edmonton, making a total of twenty showrooms, and, in addition, two travelling showrooms operated in the outlying districts. The company has acquired the undertaking authorised by the Wood Green Electric Lighting Order, 1902, and took over operation as from January 1st last. The second section of the Brimsdown power station was put on commercial load during the year. The total capacity of the station is now 100,000 kW. Arrangements were made in December for selling 206,884 six per cent. cumulative preference shares, being the balance of the 250,000 shares created in February, 1930. Of these 55,929 were allotted before December 31st and the remainder have been allotted since. Meeting: February 21st.

The Underground Group.—The following dividend announcements are made:—

Metropolitan District Railway Co.—Final dividend on the ordinary of 1½ per cent. against 2 per cent. last year, making 3 per cent. against 4½ per cent. £88,000 to reserve, against £110,000. Carry forward £53,932 against £54,096.

London Electric Railway Co.—Final dividend of 1½ per cent. on ordinary, making 3 per cent. against 4½ per cent. £224,100 to reserve against £203,000. Carry forward £203,575 against £204,049.

City & South London Railway Co.—Final of 1½ per cent. on ordinary, making 3 per cent. for the year against 4½ per cent. To reserve £19,500 against £30,000. Carry forward £40,372 against £40,447.

Central London Railway Co.—Dividend on undivided ordinary as above: 2 per cent. on deferred stock against 5 per cent. To reserve £43,000 as before. Carry forward £113,551 against £113,704.

Underground Electric Railway.—2½ per cent. on ordinary against 4 per cent., making 4½ for the year against 7 per cent. Carry forward £329,265 against £369,084.

London & Suburban Traction Co.—No preference dividend, same as last year. Carry forward £78,471 against £68,573.

City of Buenos Aires Tramways Co. (1904), Ltd., reports that an annuity of £70,660, payable by the Anglo-Argentine Tramways Co., Ltd., has been received and that there was a net profit of £72,133 (£71,718 in 1931). It is proposed to make a final dividend of 1½ per cent., making 5 per cent. for the year (same), and to transfer £9,000 (£8,500) to the amortisation and general fund, leaving £2,943 (£1,809) to be carried forward.

The London Electric Supply Corporation, Ltd., is to pay a final dividend on its ordinary shares of 4 per cent., making 7 per cent. for the year. Pending the settlement of the new standard prices, to operate as from January 1st, 1932, under the provisions of the sliding scale scheduled to the London Electricity (No. 2) Act, 1925, it is not possible to ascertain the amount of the consumers' benefit, if any, for 1932.

Hall Telephone Accessories (1928) report a net profit for 1932 of £44,697 (against £49,413), to which was added £6,681 brought forward, making £51,378. It is proposed to pay a final dividend of 5 per cent. (same) on the ordinary capital and a bonus of 1½ per cent. (against 2½ per cent.), leaving £6,697 to be carried forward.

Anglo-Portuguese Telephone Co., Ltd.—Arrangements have been made to place on the market privately a limited amount of 5½ per cent. first debenture stock. Permission to deal has been applied for, and dealings are expected in the market to begin on the basis of £100 per cent.-£101 per cent. The stock will be dealt in free of stamp.

The Northampton Electric Light and Power Co., Ltd.—The directors recommend a final dividend of 6 per cent. on the ordinary shares, making 10 per cent. for the year (same). The annual general meeting will be held on February 27th.

The Rushden & District Electric Supply Co., Ltd.—A final dividend of 4½ per cent., making 8 per cent. for the year (same), is recommended. The annual general meeting will be held on February 27th.

Chiswick Electricity Supply Corporation is paying a final dividend of 6 per cent. on the ordinary shares, making 11 per cent. for the year (same). 50,000 new shares issued in July which did not receive the interim will share in the final dividend.

The Midland Electric Manufacturing Co., Ltd., is again paying a dividend of 10 per cent. on the ordinary shares, plus a bonus of 12½ per cent., less tax, for the year to December 31st last.

The St. James' & Pall Mall Electric Light Co., Ltd., has announced a final dividend of 3.4d. per share on the ordinary shares, making the standard dividend of 7 per cent. for the year.

The American Telephone & Telegraph Co. reports a net income for 1932 of $146,000,000 ($7.32 per share) as compared with $167,000,000 ($9.5 per share) in 1931.—*Reuter.*

Electrical Distribution of Yorkshire announces a final dividend of 4½ per cent., making 9 per cent. for 1932 (same).

Norwich Electric Tramways Co. is to pay an interim dividend of 2½ per cent. (same).

Stocks and Shares

TUESDAY EVENING.

EXCITEMENT over South African mining shares having partially subsided, and the speculation running on more sober lines than those of a week ago, attention has had more scope for diversion into other markets of the Stock Exchange. Interest is again attracted to stocks and shares that are not closely affected by the expectations that cluster around the present price of gold. The Industrial market shows an increase of activity. In the electricity supply list, Chiswicks are something of a feature, with a jump to 45s. 6d. on the increase to 11 per cent. in the dividend. Home Railways have come in for a little notice, and Metropolitan Consolidated ordinary, together with Central London Assented ordinary, have advanced sharply. Recoveries in Cables and Wireless stocks are an outstanding point of interest.

Gilt-edged Stocks Good

Central London Electricity 4½ per cent. debenture stock has risen to 108; London and Home Counties 4½ per cent. debenture to 107. Prices of gilt-edged stocks maintain their level very well on the whole, in spite of a growing impression that such securities stand at prices justifiable only by reference to the abundance of money and the quietude of industry. Were trade to improve throughout the country, and internationally, the argument runs that these gilt-edged stocks would have to suffer a general fall, though, as mentioned here lately, the indications of trade revival are not yet sufficiently strong to warrant any immediate realisation of gilt-edged stocks, which, in point of fact, remain in keen request. Metropolitan District Railway assented first preference stock has risen 2¼ to 80. The 5 per cent. debenture stocks of the Central London, London Electric, and Metropolitan District have all advanced to 116¼. Other prior-charge issues in the same group have hardened from 1 to 2 points, movements that reflect the insatiable absorption of stock by investment.

Tube Railway Dividend Cuts

The dividends declared by the tube railways are anything but cheerful. Reductions have taken place in every case. The faint hopes raised of a possible dividend on London and Suburban Traction preference shares have been shattered by the announcement that no distribution is to be made. Underground Electric ordinary have fallen away to 18s., Metropolitan District to 56¼ showing declines of a shilling and 3 points respectively. The rise in the price of Central London

Assented ordinary is due to the fact that the dividend is fixed at 4 per cent., whereas that on the non-assented, as just observed, has been cut by 1½ per cent. Metropolitan Consolidated has gone ahead to 65, showing a gain of 3 points, upon further hopes that Parliament in the present week will deal with the London Passenger Transport Bill, and will bring into nearer prospect the scheme under which the Metropolitan Railway would enter the combine.

Conversions?

The North Metropolitan Electric Power Supply Company is paying 6 per cent. final dividend on its ordinary shares, making 10 per cent. for the year, the same as before. The price of the ordinary shares is a little better at 55s. 6d., the 6 per cent. preference remaining at 25s. Anticipation looks for an early announcement that the company's existing debentures may be replaced by another stock bearing a lower rate of interest. Similar operations are rumoured as likely to be proposed by other companies associated with the electrical industry.

Edmundson's 4 per cent. debenture stock is on offer at about 100½, free of stamp and fee. Midland Electric 4 per cent. debenture can be bought at 104 free of stamp and fee.

Home Electricity Shares

The advance in the dividend on Chiswick Electricity Supply served to bring in buyers for other shares in the same group. Chiswick shares rose a florin to 45s. 6d. Hendon ordinary are better at 95s. 6d. Metropolitan at 2½ have risen 1/6. The provincial shares show noticeable strength. Bournemouth and Poole are 1/6 up to 3⅝. Yorkshire are similarly higher at 43s. 3d. Northamptons rose to 51s. 3d., Lancashire to 33s. 3d., Midland Counties to 35s. 6d., and Midland Electric Power to 36s. 3d. West Gloucestershire ordinary, after reacting to 64, recovered to 65½. There has been pressing demand for the company's preference stock, the nominal price of which is 103, with little supply available to meet the enquiries of the prospective purchasers.

Victoria Falls and Power

In the Colonial group, Victoria Falls and Power ordinary, after a rise to 85s. 6d., went back to £4. Reaction followed a statement that the savings in interest and in Sinking Fund requirements, rendered possible when the debenture issues are repaid in 1936, will not become entirely available for the ordinary shareholders, in that part of the earnings may go towards depreciation, and, also, towards a reduction of costs to the consumers. The company is paying 15 per cent. at the present time, and although its supporters may not look for the dividend to be doubled three years hence, they will probably be disappointed if the rate does not go up to 25 per cent. after the debentures are redeemed.

Cables and Wireless

Further expression of optimism in regard to the outlook for the Cables & Wireless Combine has resulted in a good deal of market activity, and in fairly sharp fluctuations in the prices. The preference stock remains the centre of the animation, and at 85½ shows a 2 points rise, following upon an equal improvement last week. The "B" stock is a point better at 12, and the "A" at 29 shows a gain of 1½. It is assumed that the boomlet in Kaffir shares will make a favourable impression upon the Combine's receipts. Anglo-American preferred stock has strengthened to 106, and the deferred to 25½, a gain of 10s. apiece. American Telephone & Telegraph at 150½ is 6 points up. International Telephones remain about 10. The strength of Cables & Wireless is reflected in Globe Telegraph & Trust ordinary, which have risen 20s. to 12, the preference being 10s. up at 11¾.

Telsen's

No little interest has been aroused this week in the shares of the Telsen Electric Company, which manufactures wireless apparatus, &c. Shares were placed in the London market not very long ago at £3 per share. A dividend of 10s. per share free of tax was declared and paid last August. The price of the shares rose to nearly £4. They were considered a promising investment, tinged, of course, with the speculative quality inseparable from shares connected with the wireless industry. During the past few days the company announced that there would be no interim dividend on the ordinary shares. The price immediately collapsed: it slumped to 20s., rallying to the neighbourhood of 29s. No explanation has yet been forthcoming to account for what seems to be a remarkable change of fortune, or of outlook, within a very short time. People who bought the shares at the higher figures are not unnaturally asking for some reason that shall account for the disappointment, and the drop in the price.

The Irresistible Advance

The statistics issued this week regarding the increase in electricity generated in 1932 and in January, 1933, are inferentially favourable to the manufacturing equipment companies. General Electric ordinary have risen to 42s. British Aluminiums are 6d. up at 25s. 6d. Ever-Ready shares reacted to 30s. and Ever-Ready Trusts, after a rise to 22s., went back to 20s. 3d. Electric Constructions fell to 12s. 6d. Brush ordinary retains its substantial advance to 57s. The iron and steel market is better, and a rise of 1s. 9d., to 40s., in Babcock & Wilcox, reflects the tendency. Even the rubber market, Cinderella of the Stock Exchange, shows a disposition to brighten.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1930.	1931.	Price, Feb. 14.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	72/6	+⅛	4 2 8
Brompton Ordinary	1	8½	8½	33/6	—	4 3 7
Central Electricity 4½% Deb.	Stock	4½	4½	108	+1	4 3 4
Charing Cross Ordinary	1	8½	8½	33/6	—	4 3 7
Chelsea	1	8⅞	8⅞	33/-	—	4 4 10
City of London	1	10	10	34/6	—	4 1 2
Clyde Valley	1	8	7	35/-	—	4 0 0
County of London	1	11	10½	53/3	+⅛	4 0 2
Edmundsons' 7% Pref.	1	7	7	29/6	—	4 15 0
Elec. Dis. Yorkshire	1	9	9	43/9	+⅛	4 2 2
Elec. Supply Corporation	1	11	11	63/9	—	3 9 0
Kensington Ordinary	1	8	8	33/6	—	4 3 7
Lancs. Light and Power	1	6½	7	33/3	+9d.	4 6 2
London & Home Counties 4½% Deb.	Stock	4½	4½	107	+1/-	4 4 0
London Electric	1	9	9	33/-	—	4 4 10
Metropolitan	1	10	10	50/-	+⅛	4 0 0
Midland Counties	1	7	7	35/-	+⅛	4 0 0
Mid. Elec. Power	1	8	8	36/3	+6d.	4 8 2
North Eastern Electric Ordinary	1	6	6	29/6	—	4 1 4
Do. 7% Pref.	1	7	7	32/-	—	4 7 6
Northampton	1	10	10	51/3	+⅛	3 18 2
Notting Hill 6% Pref.	10	6	6	12⅝	—	4 14 0
North Met. Elec. 6% Pref.	1	6	6	29/-	—	4 2 9
St. James' and Pall Mall	1	8	8	33/-	—	4 4 0
Scottish Power	1	8	8	35/9	+9d.	4 9 5
South London	1	8½	8½	33/-	—	4 4 10
Urban Ordinary	1	7	7	31/6	—	4 1 2
Westminster Ordinary	1	8½	8½	33/-	—	4 4 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	17/6	—	8 11 2
Yorkshire Elec.	1	8	8	43/3	+⅛	3 14 2
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	85½	+3	4 13 7
Metropolitan	„	3½	2½	65½	+3	3 17 0
Do. District	„	5	4½	56½	—3	5 6 2
Underground Electric	1	8	7	18/-	—1/-	5 0 0
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	150½	+6	5 19 7
Anglo-Am. Tel. Pref.	Stock	6	6	106	+½	5 13 2
Do. Def.	„	1½	1½	25½	+½	5 17 8
Cables & Wireless 5½% Pref.	„	5½	2⅞	85½	+2	3 4 4
Do. A 7½% Ord.	„	—	Nil	29	+1½	—
Do. B Ord.	„	—	Nil	12	+1	—
Globe Tel. and T. Ord.	10	8½	Nil	12	+1	—
Do. do. Pref.	10	6	6	11¾	+½	5 2 2
Great Northern Tel.	10	20	20	28	—	7 2 10
Marconi-Marine	1	15	10	35/-	—	5 14 3
Oriental Telephone Ord.	1	12	12	3	—	*4 0 0
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	—	—	1/9	—	—
Do. do. 2nd Pref.	5	—	—	1/9	—	—
Do. do. 5% Deb.	Stock	—	—	6	—	—
British Electric Traction Def. Ord.	„	5	5	225	+5	—
Do. do. Pref. Ord.	„	8	8	131½	—	5 19 0
Brazil Traction	100	—	—	10⅜	+½	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	102½	—	4 19 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	12/-	—	—
London United Tram Deb.	Stock	4	4	67½	—	6 2 2
Mexico Trams, 5% Bonds	—	5	5	47½	—	10 10 6
Mexican Light Common	100	Nil	Nil	10	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	76½	+3½	6 10 9
Victoria Falls Ord.	1	15	15	74	+⅛	3 15 0
Yorkshire (West Riding)	1	Nil	Nil	5/6	—	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	6	4	17/6	—	4 11 5
Do. Pref.	1	8	8	32/-	—	5 0 0
Babcock & Wilcox	1	14	14	40	+1/9	—
British Aluminium Ord.	1	10	5	25/-	+6d.	4 0 0
British Insulated Ord.	1	15	15	67/3	—	4 8 4
Brush Ord.	Stock	5	Nil	57	—	—
Callender's	1	15	15	3	—	5 0 0
Do. 6½% Pref.	1	6½	6½	28/3	—	4 12 0
Crompton Parkinson Ord.	5/-	30	24	22/6	—	5 0 0
Do. 8% Pref.	1	8	8	30/-	—	5 6 8
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	12/-	—⅛	—
Enfield Cable Ord.	1	25	25	4⅜	—	5 8 1
English Electric	1	Nil	Nil	12/6	—	—
Do. do. Pref.	1	Nil	Nil	16/-	—	—
Ever Ready	5/-	35	35	30/-	—3d.	5 16 0
Ferranti Pref.	1	7	7	23/9	—	5 18 0
G.E.C. Pref.	1	6½	6½	29/6	+6d.	4 8 2
Do. Ord.	1	10	8	42/-	—1/3	3 16 2
Henley's	1	30	30	6⅝	—	4 15 1
Do. 4½ Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber	1	Nil	Nil	2/6	—	—
Johnson & Phillips	1	10	5	1	—	5 0 0
Siemens Ord.	1	7½	7½	26/3	—	5 14 1
Telegraph Construction	£1	Nil	Nil	16/3	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1931

19368. "Signs and traffic control indicators." E. Wild. July 6th, 1931. (386650.)
19450. "Electric discharge illuminating device." Federal Electric Co., Inc. October 27th, 1930. (386651.)
19636. "Thermionic valve circuits." O. Morino. July 8th, 1930. (386668.)
19803. "Manufacture of electric insulators." C. S. Garland. July 9th, 1931. (386652.)
20422. "Method of, and means for, controlling electric currents by gaseous discharge tubes." Igranic Electric Co., Ltd. (Cutler-Hammer Manufacturing Co.). July 16th, 1931. (386675.)
20542. "Secret telegraphic systems." Siemens and Halske Akt.-Ges. July 17th, 1930. (386676.)
20742. "Method of and apparatus for superimposing an alternating current component on the direct current of arc lamps, spot light lamps, cathode glow discharge lamps, and the like." International General Electric Co., Inc. July 21st, 1930. (386678.)
20975. "Magnetic alloys." W. S. Smith, H. J. Garnett, W. F. Randall, Telegraph Construction & Maintenance Co., Ltd., and Deutsch-Atlantische Telegraphen Ges. July 22nd, 1931. (Addition to 357947.) (386682.)
21071. "Automatic reclosing mechanism for electric switches." General Electric Co., Ltd., and W. Wilson. July 23rd, 1931. (386684.)
21092. "Electric couplings." Edison Swan Electric Co., Ltd., and T. F. Stent. July 23rd, 1931. (386685.)
23612. "Incandescent cathodes for thermionic tubes." Lignose Horfilm System Breusing Ges. August 21st, 1930. (386706.)
25960. "Electric motor control systems." International General Electric Co., Inc. September 18th, 1930. (386714.)
26084. "Electric motor control systems." F. Whyman and Associated Electrical Industries, Ltd. September 17th, 1931. (386716.)
26109. "Electromagnetic switches or relays." L. Satchwell. September 17th, 1931. (386717.)
26942. "Telegraph systems." W. W. Triggs (Teletypesetter Corporation). September 28th, 1931. (386723.)
27058. "Electrical heating apparatus." J. Shaw & Sons, Wolverhampton, Ltd., and W. E. Hankins. September 29th, 1931. (386727.)
27331. "Electric tumbler switches." General Electric Co., Ltd., and J. H. Collings. October 1st, 1931. (386728.)
27725. "High-tension switchgear." Akt-Ges. Brown, Boveri et Cie. October 15th, 1930. (386729.)
28443. "Electromagnetic moving-coil instruments." C. H. Heinlein and Darwins, Ltd. October 13th, 1931. (386732.)
29331. "Overload safety devices for mechanisms driven by electric motors." Dorr Co., Inc. November 1st, 1930. (386736.)
31212. "Electrical heating apparatus and the method of constructing the same." L. J. Fowler, J. L. Musgrave, and R. Crittall & Co., Ltd. November 11th, 1931. (386742.)
31353. "Telegraphy and like signalling systems." Siemens Bros. & Co., Ltd., and L. S. Crutch. November 12th, 1931. (386743.)
31495. "Electric motors." British Thomson-Houston Co., Ltd., and A. A. Pollock. November 13th, 1931. (386744.)
32663. "Synchronous electric motors and means for starting them." English Clock & Watch Manufacturers, Ltd., and H. N. Walford. September 22nd, 1932. (386756.)
32702. "Electric cables for communication purposes." Siemens Bros. & Co., Ltd., and E. P. Elwin. November 25th, 1931. (386757.)
33045. "Electric condensers." C. A. Charlesworth and E. E. Rosen. November 28th, 1931. (386759.)
33269. "Control of electric motors." J. G. Smithson. December 1st, 1931. (386762.)
33347. "Electric switches." H. B. Prentice. December 1st, 1931. (386763.)
33539. "Electrical systems for transmitting and/or relaying speech or low-frequency currents." Siemens Bros. & Co., Ltd., and W. H. Grinsted. December 3rd, 1931. (386764.)
34785. "Radio receiving instruments and amplifiers." C. P. Stanworth and Hirst, Ibbetson & Taylor, Ltd. December 16th, 1931. (386776.)
35654. "Telegraph signalling apparatus." Imperial & International Communications, Ltd., and H. V. Higgit. December 24th, 1931. (386784.)

1932

921. "Electrolytic production of iron." Vereinigte Stahlwerke Akt.-Ges. January 19th, 1931. (386790.)
1396. "Domestic and like electric irons." Electric Iron Grip Switch Co., Ltd. March 25th, 1931. (386794.)
2213. "Electric hair brushes." J. I. Sabel. January 25th, 1932. (386796.)
2526. "Brush gear for dynamo-electric machines." W. Orr, and Associated Electrical Industries, Ltd. January 27th, 1932. (386797.)
3028. "Galvanic batteries." Oldham & Son, Ltd., and W. D. Wilde. February 1st, 1932. (386799.)
3982. "Alternating current telegraph systems." Siemens Bros. & Co., Ltd., L. S. Crutch, and P. A. Chittenden. February 10th, 1932. (Cognate application 21327/32.) (386805.)
8101. "Electric resistance controllers." Soc. Anon le Carbone. March 26th, 1931. (386823.)
8237. "Electrical insulating materials." International General Electric Co., Inc. March 19th, 1931. (386824.)
8244. "Electric motors with starting gears." Stephen-Getriebe Ges. October 20th, 1931. (386825.)
9551. "Controlling device for electric drives for knitting-machines." Siemens-Schuckertwerke Akt.-Ges. April 2nd, 1931. (386833.)
11456. "Electric motors." P. Groschopp, R. Oemig, and A. Oemig (trading as Oemig & Co.). April 21st, 1932. (386841.)
13301. "Television systems." Dr. S. Loewe, and M. Von Ardenne. May 9th, 1931. (386849.)
13647. "Appliances for the treatment of the larynx with ultra-violet rays." A. Cemach. May 18th, 1931. (386850.)
16471. "Electric rectifying apparatus." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). June 10th, 1932. (386873.)
18275. "Electro-magnetic devices for the inter-conversion of mechanical and electrical impulses, for example, gramophone pick-ups." C. Collaro, and Collaro, Ltd. June 28th, 1932. (386882.)
19836. "Electric transformers." British Thomson-Houston Co., Ltd. (Allgemeine Elektricitäts Ges.). July 13th, 1932. (386891.)
20742. "Electrolytic recovery of copper from alloys." T. Lewin. July 22nd, 1932. (386896.)
21481. "Electric fuses." International General Electric Co., Inc. July 31st, 1931. (386900.)
23618. "Electrically insulating compositions." British Thomson-Houston Co., Ltd. August 24th, 1931. (386915.)
24095. "Electric switches." British Thomson-Houston Co., Ltd. August 28th, 1931. (386917.)
24844. "Filaments and electrodes for electric lamps and discharge devices." General Electric Co., Ltd. October 31st, 1931. (386919.)
25397. "Methods of operating electric motors." British Thomson-Houston Co., Ltd. September 14th, 1931. (386921.)
26233. "Control of electric current passed by electronic tubes." Igranic Electric Co., Ltd. (Cutler-Hammer Manufacturing Co.). July 16th, 1931. (Divided application on 20422/31). (386687.)
29098. "Rotors." Akt-Ges. Brown, Boveri et Cie. November 5, 1931. (386931.)
35163. "Spacing rods for electrical accumulators." Britannia Batteries, Ltd. December 12th, 1931. (386938.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from February 8th:—

Fuller. No. 528031. Class 8. Primary and secondary batteries (not for medical purposes).—Fuller Accumulator Co. (1926), Ltd., Woodland Works, Grove Road, Chadwell Heath, Essex.

Phœnix. No. 536409. Class 8. House telephones and receivers and transmitters therefor.—Phœnix Telephone and Electric Works, Ltd., 38, Newman Street, W.1.

Panther. No. 536985. Class 8. Radio receiving and transmitting sets, radio receiving sets in combination with gramophones, and parts thereof.—Ultra Electric, Ltd., Ultra Works, Erskine Road, N.W.3.

Pirate. No. 537815. All goods in Class 8.—Majestic Electric Co., Ltd., Majestic Works, Tariff Road, Tottenham, N.17.

Goodyear (lettering and design). No. 529641. Class 11. Electric batteries (for medical purposes).—Goodyear Tire & Rubber Co., Akron, O., U.S.A. (British representatives: Mewburn, Ellis & Co., 70-27, Chancery Lane, W.C.2.)

Bicaloy. No. 537735. Class 13. Electrodes of ordinary metal for electric welding.—British Insulated Cables, Ltd., Prescot, Lancs.

Electricity Supply in East Surrey

A PUBLIC inquiry was opened by the Electricity Commissioners at the Institution of Electrical Engineers, W.C., on February 8th (Sir John Brooke presiding) in relation to a Draft Order promoted by the London and Home Counties Joint Electricity Authority. The object of the Draft Order is to transfer from local municipal authorities to the J.E.A. the rights of purchase (exercisable at various dates) of certain company undertakings. The districts concerned include Beddington, Caterham, Coulsdon, Epsom, Maldon, Merton, Mitcham, Morden, Purley, Wallington and Wimbledon.

Many local authorities lodged objections.

Sir Lynden Macassey, K.C., for the J.E.A., said that the Authority was formed in 1925 for the purpose of securing a cheap and abundant supply of electricity. Its policy of securing purchase rights had received the general approval of the Commissioners in 1928. The Authority had purchased undertakings from time to time, but as an alternative it had come to terms with companies to produce schemes with the same object in view. It was not the policy of the Authority to disturb companies which were giving good service. He referred to the good service given by the J.E.A. in Thames Valley and Mid-Surrey. The Order would prevent the breaking up of important electrical areas, and would prevent a narrow regard for local interests obtaining. The County of London Company had produced a scheme which would exclude the Authority for fifty years in 61 sq. miles, but under the proposals of the J.E.A. the area to be covered would be 111 sq. miles.

Mr. Arthur W. White (Messrs. Cash, Stone & Co.) cross-examined by Mr. W. Tyldesley Jones, K.C., admitted that the J.E.A. incurred a loss, apart from income tax and bad debts reserve, of about £20,000.

Mr. F. W. Purse (chief engineer, J.E.A.), claimed that the Authority had been successful in obtaining uniform charges for electricity in the areas which it had taken over and that the passing of the Order would improve the position. Mr. W. F. Marchant (chairman, J.E.A.), said that in all the areas under the control of the Authority prices had been reduced to the consumer. Sir John Brooke said that if the Commissioners made an Order, its confirmation might involve a further inquiry. The J.E.A. would then have to make an agreement with the company that was satisfactory to all parties. The Commissioners would then decide what was a reasonable settlement. He asked the parties to agree to an adjournment (as short as possible) to enable the Commissioners to discuss matters with them. Inquiry adjourned until further notice.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alcester.—Extensions, casual wards (£4,558); Humphreys, Ltd., London, S.W.

Alton (HANTS).—Houses (50); F. Milton & Sons, builders, Witley.

Barking.—Development, Movers Lane Estate; borough engineer. School, Biffroms site (£37,000) for E.C.

Barnsley.—Isolation and cubicle block, with operating theatre, Kendray Hospital; borough surveyor.

Basingstoke.—Houses (84), Worting Road site; borough surveyor.

Bath.—Cinema, Southgate Street; W. H. Watkins, architect, Bristol. Domestic science training college (£20,999); F. J. Amery & Sons, Ltd., builders.

Belvedere (KENT).—Parish hall and institute; G. E. Burgess, architect, Market Place Chambers, High Street, Dartford.

Birmingham.—Hotel, Suffolk Street and Severn Street (£100,000), for A. C. Magner, of Wells & Magner, Ltd.; J. Cotton, estate agent, 35, Waterloo Street.

Blackpool.—Public baths, North Shore (£150,000); borough surveyor. Hotel, South Shore (£750,000); J. Massey, Sheffield.

Bognor Regis.—Conversion of Craigwell House, Aldwick, into hotel; D. B. Gray, land agent, Mount Street.

Bradford.—Houses (34), Bronte Old Road: R. Picken & Co., Ltd. Houses (51), Green Lane, Wyke; A. Hanson.

Brentford.—Alterations, Coronet Cinema, High Street; F. A. Sargeant.

Bridlington (YORKS).—Branch, tailoring premises, for Montague Burton, Ltd., Hudson Road, Leeds; H. Wilson, company's architect, 81, North Lane, Roundhay, Leeds.

Bristol.—Houses (100), Bedminster and St. Anne's Estates (£30,000); Simms, Sons & Cooke, Ltd.

Buckhaven (FIFESHIRE).—Houses (82) and bungalows; burgh surveyor.

Buckingham.—Houses (20); C. H. Wright, R.D.C. architect, 24, Temple Street, Aylesbury.

Cambridge.—Houses (366), Newmarket Road, for New Ideal Homesteads, Ltd.

Canvey Island.—New Council Offices; P. G. W. Stokes, engineer and surveyor, Council Offices, Long Road.

Cardiff.—Shopping centre, Fairwater Estate; H. Budgen & Co., architects.

Cardiganshire.—Casual ward extensions, Tregaron and Aberystwyth; county engineer.

Chelmsford.—Keene Memorial Homes, with electrical work (£15,169); W. E. Wisbey, builder.

Colchester.—Development of Whitehall Estate: Tamworth Park Construction Co., Ltd.

Coventry.—Technical college, The Butts; A. Wm. Hoare, architect, 28, Trinity Churchyard.

Crewe.—Hotel and restaurant for Councillor J. H. Kettell.

Davyhulme.—Extensions, schools, Cornhill Road (electrical installations); W. Longworth, 4, St. Mary's Parsonage, Manchester.

Doncaster.—Extensions, including out-patients' department, infirmary (£12,000); Walker & Thompson, architects.

Douglas (I.O.M.).—Waterworks (£85,370); T. C. Greenfield, water engineer.

Dover.—Flats, with electric lift and heating work, for the Harbour Board (£6,132); J. J. Clayson & Son, builders.

Edinburgh.—Additions and improvements to Gogarburn and Bangour Institutions (laundry equipment and heating) (£26.000). Extensions, Heriot-Watt College (£30,000); E. J. MacRae, city architect.

Felling-on-Tyne.—Houses (139), Stoneygate Lane; C. W. Hall, U.D.C. surveyor, Council Offices.

Fifeshire.—Mining school, Cowdenbeath (£21,000); county clerk, Cupar.

Folkestone.—Houses (32); Building & Public Works Construction Co., Ltd., Swindon, builders. Hotel and service flats: Princes Mansion Hotel, Ltd.

Gillingham.—Estate development, Watling Street; Style & Winch.

Glasgow.—Cinema, Muirend; W. B. Inglis, Boulevard Picture House, Knightswood. Bus depôt, Germiston Street and Buchanan Street (£20,000), for Scottish Motor Traction Co., Ltd., 24, Reidvale Street; N. MacWhannell, architect, 233, West Regent Street. Works extensions, Kennishead; H. Wiggin & Co., Ltd.

Gloucester.—General Post Office, King's Square; E. Crowder, builder, Handsworth, Birmingham.

Guildford.—Chapel of Ease, Stoughton (electrical lighting and heating work); W. G. L. Sheppard, builder.

Havant.—Hospital extensions (£2,649); G. & R. Carrell, builders, South Street.

Hayes (MIDDLESEX).—Housing scheme; A. F. Davis, Kilburn.

Hemel Hempstead.—Firework factory; Brocks' Fireworks, Ltd., 109, Cheapside, E.C. School, Crabtree Lane, for the Borough E.C.; Major Maule, architect.

Hertford.—General Post Office; H.M. Office of Works, King Charles Street, S.W.1.

Hexham (NORTHUMBERLAND).—Houses (76); W. Langland, U.D.C. surveyor, Council Offices.

High Wycombe.—Factory extensions, Leigh Street, for W. Birch, Ltd.

Hull.—Stores, Endyke Lane Estate; Co-operative Society, Ltd. New departments, Hall Road and Eastfield Road schools; city architect.

Huyton (LIVERPOOL).—Church, Housing Estate; Rev. C. O'Connor Fenton, vicar of St. Bartholomew's, Roby.

Inverness.—Aerodromes, Thurso, Wick, and Kirkwall, for Highland Air Ways.

Kingston-on-Thames.—Block of business stores, Thames Street, for British Home Stores, Ltd. Blocks of flats, Norbiton; borough surveyor.

Ledbury.—Houses (38), Oatley's Crescent Estate; W. F. Bickford, U.D.C. surveyor.

London.—(DEPTFORD).—Rehousing, Bronze Street area (£125,000); L.C.C. architect. (HACKNEY).—Tenements and flats (138), Banister area, Homerton (£98,460); borough engineer and surveyor. (HENDON). — Improvements, Colindeep Lane (£24,750); borough surveyor. (ST. PANCRAS).—Dwellings, Ossulton Estate (£55,600); Gee, Walker & Slater, Ltd. (STEPNEY).—Tenements, Holland Estate (£2,562); W. H. Gaze & Sons, Ltd. (WILLESDEN).—Houses (£37,242); U.D.C. surveyor.

Long Eaton (DERBYSHIRE).—Swimming baths, Grange Park, Station Road (£7,000); Surveyor's Dept., Town Hall.

Market Bosworth.—Houses (24), Hinckley Road, Ibstock; H. G. Davey, surveyor, Bank Chambers.

Maybole (AYRSHIRE).—Six blocks of houses; burgh surveyor.

Morecambe.—Business premises, Euston Road, Anderton Street, and Cheapside; J. Thornton, architect.

Motherwell.—Houses (100) (£19,000); burgh surveyor.

Newcastle-on-Tyne.—Hospital, near the Home for Incurables, and school, Cowgate; F. H. Holford, city architect, Town Hall.

Newent (GLOS).—Houses (26); W. Francis, R.D.C. surveyor.

Plymouth.—Canning factory; Tamar Valley Canning Co., Ltd. Clinic, Rowe Street; city architect. Development, Barne Estate, St. Budeaux; C. Jope. Offices, showrooms and workshops, Cemetery Road; J. Geath & Son. Shops, York Street; Jillard Bros.

Redditch.—Houses (110); Salter's Lane Estate; Surveyor's Office, Council House.

Ripon.—Steel houses (20); H. Wilson.

Rochdale,—Houses (92), Cutgate Estate; S. H. Morgan, borough surveyor.

Romford.—Housing scheme, Upminster; R.D.C. surveyor. Church (£10,000), Laurie Square, for Salem Baptist Trustees; secretary.

Rotherham.—Estate development, Moorgate; Sutcliffe and Taylor. Three shops, Howard Street; Sterling Estates, Ltd. Four shops and houses, Badsley Moor Lane; J. W. Bailey.

Scarborough.—Café, The Mere (£3,500); borough engineer. Development of Newlands Park Estate; Wilkinson & Smith. Shop premises, North Street and Newborough; Montague Burton, Ltd.

Sheffield.—Houses (80), Gleadless Road; A. & E. Tate, builders, Granville Road. Houses (600), Handsworth; Miss Helliwell, The Triangle, Halifax.

Shoreham (SUSSEX).—Houses (44); W. H. Green, builder, Portslade.

Sidcup (KENT).—Shops and 369 houses, Foots Cray Park Estate; Dyer, Son & Creasey, surveyors, 111, Station Road. Shops (23), Sherwood Park Avenue; M. Holmes & Son, surveyors, 33, Paternoster Row, E.C.4.

Slough.—Houses (32), Beech Road and Downs Road, for W. T. Heath.

Solihull.—Extensions, Salter Street School; managers.

Southall.—Housing scheme, Charity lands; U.D.C. surveyor. Houses (22), Tentelow Lane; Waterhouse & Co. Three shops, North Road; E. Hayes.

Southport.—Estate development, Marshside Road and Cambridge Road; Hesketh Estates, Ltd. Estate development, Queen's Road and Leyland Road; W. J. Poole.

Stockton-on-Tees.—Houses (162), Glebe Estate (£45,036); G. Fordy.

Stourport.—Conversion of Severn House into public offices (electrical and central heating work); L. H. Poole, U.D.C. surveyor. Business stores for Kidderminster Co-operative Society; secretary.

Stranraer.—Extensions to Garrick Cottage Hospital (£6,000); medical superintendent.

Stretford.—Houses (244), Haigh Road, &c.; McLennan & Abel.

Suffolk.—Elementary school, Suffolks Estate, Enfield (£33.340), for County E.C.

Surrey.—Science, art, and practical subjects' centre, New Malden; girls' secondary school, Nonsuch Park Estate, Cuddington; and school extensions, Chipstead Valley, Mitcham, and Smitham Bottom, for the County E.C.

Sutherland.—School, Bonar-Bridge, for the County E.C.; D. E. A. Horne, education architect, Golspie.

Swadlincote.—Houses (48) and bungalows (16), Nelson Street; U.D.C. surveyor.

Tolworth.—Cinema (£25.000), with electrical work, for Odeon (Tolworth), Ltd.: Wright & Sons, builders, Stockwell. Hotel (£17.000), Ewell Road, for G. C. Silcock.

Tutbury (DERBYSHIRE).—Houses (38); R. S. Litherland, R.D.C. architect, 10, High Street, Burton-on-Trent.

Wakefield.—Shops, Eastmoor Estate; housing architect.

Walton-on-Thames.—Clinic (£2,425); S. Dale & Son.

Warlingham.—Private aerodrome, Hamsey Green; R. Gardiner, "Overhill."

Watford.—Houses (100), Leavesden Green; borough surveyor.

Warwickshire.—Junior school (400 places), Keresley; county architect.

Whitefield.—School, Besses o' th' Barn; director of education, County Offices, Preston.

Widnes (LANCS).—Houses (33), Midland Street; J. E. Farrell, builder, Birchfield Road.

Wimborne (DORSET).—Estate development, Corfe Mullen, for houses and shops; H. G. Palmer.

Wollaston.—Buildings, Council Street and Newton Road, for the Co-operative Society, Ltd. (electrical installations); W. Peacock & Son, builders, 50, Newton Road, Rushden, Northants.

Wolverhampton.—Works extensions, Lower Stafford Street; Leatherworkers, Ltd.